ISSN 2313–1799

SCOPUS

Journal of East African Ornithology

A publication of the
Bird Committee of the
East Africa Natural History Society

Edited by
Darcy Ogada
Graeme Backhurst

Volume 38(1), January 2018

BirdLife INTERNATIONAL

NatureKenya
The East Africa Natural History Society

Scopus: Journal of East African Ornithology
38(1), January 2018

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Status and distribution of the Grey-olive Greenbul *Phyllastrephus cerviniventris* in Kenya, with notes on habitat requirements and breeding seasonality

James Bradley

Summary

Historically, the Grey-olive Greenbul *Phyllastrephus cerviniventris* has been a rather poorly known bird in Kenya. Recent reports, however, show it to be more widely distributed and locally abundant than published accounts suggest, and to occupy a slightly broader ecological niche. Observations confirm the species is closely associated with evergreen forest growing in locations where the water table intersects the ground surface, and suggest this association with high groundwater may be related to foraging preferences. Reports of nesting and/or fledged young indicate the species breeds during both the "short" (October-December) and "long" (Mar-June) rains.

Keywords Grey-olive Greenbul, Kenya, distribution range, groundwater

Status and distribution

Known locations

In Kenya, the Grey-olive Greenbul has been described as "poorly recorded", with a distribution both "inadequately known" (Lewis & Pomeroy 1986) and "curiously fragmented" (Britton 1980). Based primarily on pre-1980 field observations, it is best known from the Taveta and Oloitokitok (also referred to as Lolterish) areas in the south of the country and the Kiambu/Thika area immediately to the northeast of Nairobi (Fig. 1), and these locations are widely cited (Britton 1980, Keith *et al.* 1992, Lewis & Pomeroy 1989, Zimmerman *et al.* 1996). Comparatively recent (>1996) field observations by experienced observers, as well as audio recordings and photographs, confirm its continuing presence in these areas. Around Thika it is regularly reported from the Chania River valley and associated tributaries (RS-c 1994, audio recording XC344744 @ www.xeno-canto.org) as well as from Ol Donyo Sabuk National Park (audio recording ML69672951 at www.macaulaylibrary.org), while it is also often found in remnant stream-side forest in Kiambu (photograph ML48020211 at www.macaulaylibrary.org). To the south, it has recently been audio recorded in riverine forest near Oloitokitok (XC375390), and there have been several observations since 1999 from similar habitat in the Kimana area immediately to the north (B. Finch, pers. comm.). Further observations from the Taveta area concern sight records at Kitovu Forest only as recently as 1991 (Checklists #6527767; P. Bono, and #23196968; H. Laidlaw at www.eBird.org), though there is no reason to believe the species has been extirpated from this little watched area in the years since.

Less well recognized locations also include the Tsavo River/Mzima Springs area (Keith *et al.* 1992), Bura in the Taita Hills (Britton 1980, Lewis & Pomeroy 1989), as well

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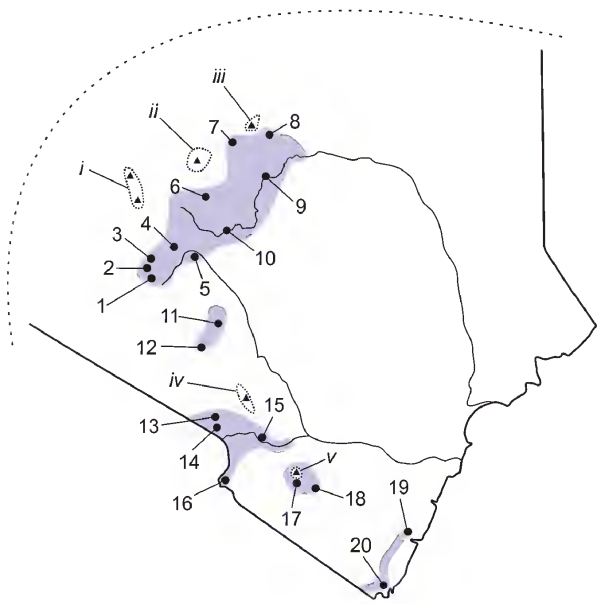
as Meru town, Tharaka, and coastal sites of Rabai and Shimoni (Britton 1980, Keith *et al.* 1992). In the Taita and nearby Sagalla Hills, its continued presence is confirmed by observations in riverine forest in 1996 (Brooks *et al.* 1998), while field observations several kilometres downstream of Mzima Springs in June 2008 confirm its continued presence in the Tsavo River drainage (B. Finch, pers. comm.). Brooks *et al.* (1998) also refer to an overlooked 1917 specimen from Tsavo, which may in fact comprise the earliest documented presence in southern Kenya.



Location		Elevation (m)
1	Nairobi National Park	1550
2	Loresho, Nairobi	1800
3	Kiambu	1690
4	Thika	1350-1475
5	Ol Doinyo Sabuk NP	1430
6	Kianyaga/Embu	1500
7	Meru	1650
8	Meru National Park	750
9	Tana River, Tharaka Dist.	470
10	Kamburu, Tana River	980
11	Makueni Hills	1550
12	Sultan Hamud Hills	1300-1500
13	Kimana	1220
14	Lolterish/Oloitokitok	ca. 1550
15	Mzima Springs & Tsavo River	690
16	Kitovu Forest, Taveta	725
17	Bura & Ronge, Taita Hills	1120-1500
18	Sagalla Hill	1200-1500
19	Rabai Dist.	ca. 150
20	Shimoni	20

Figure 1. Map of central-southeast Kenya showing known Grey-olive Greenbul *Phyllastrephus cerviniventris* sites (numbered black dots) within a broader approximated Kenyan range (grey shading). Mountain massifs mapped for reference include: *i*-Aberdares, *ii*-Mt. Kenya, *iii*-Nyambeni Hills, *iv*-Chyulu Hills and *v*-Taita Hills. Drainages (from north to south) include the Tana River, Athi/Galana River and Tsavo River.

Historical presence in Tharaka, is supported by a number of specimens collected in 1912 by Edgar Mearns (Mallalieu 2001, D. Turner, pers. comm.), one of which comprised the type specimen of the subspecies, *P. c. lonnbergi* (Mearns 1914), which is not currently recognized. The location tag for this specimen (No. 244837 @ USNM) is labeled "above the falls on Government Trail, Upper Tana River", and likely refers to a set of falls 27 km north of Muumoni Hill on the southeast boundary of current day Tharaka-Nithi County. Occurrence at Meru town, referenced by Britton (1980), is possibly based on the unpublished notes of Mr D.I.M. Wallace, who reported the species there in 1953, while presence on the coast (including purported breeding) was thought to be probable by Britton (1980), but has not been repeated by others (Stevenson & Fanshawe 2002, Zimmerman *et al.* 1996). While these latter locations are the only historical sites lacking subsequent records, they are rarely surveyed for this shy species, and continued presence is probable given that suitable habitat remains in several areas.

New locations

In addition to the above well- and lesser-known localities, new sites have been found since the mid 1990s. Grey-olive Greenbuls have been observed on the southern slopes of Mt Kenya in the Kianyaga area (RS-c 2002), and records that have only recently come to light report occurrence nearby at Embu in the 1970s (Burrell 1999). To the north they have also been captured and ringed 40 km east of Meru town and 40 km north of the site of the Tharaka records in Meru National Park (Jackson 2000, Mallalieu 2001). Along the middle reaches of the Tana River to the south, it was reliably observed in riparian forest at the outflow Kamburu Dam in May 2007 (B. Finch, pers. comm.), as well as from the adjacent Mwea National Reserve in November 2008 (eBird Checklist #32909409; L. Graf). Elsewhere to the south of the central Kenyan highlands, this greenbul was documented from hill country at Sultan Hamud in January 2011 (XC72994) and in Makueni County in September 2017 (ML68477871).

Most surprising, however, is the apparently widespread occurrence of the Grey-olive Greenbul in Nairobi. Following its discovery in the National Park in 1997 (Jackson 1997), it has been found further west in the Ololua Forest (F. Reid, pers. comm.), as well as at the Arboretum in central Nairobi (Harvey 1997, Nalianya 2000), and a handful of other locations across the northern parts of the city up to an elevation of 1800 m at Loresho and Rosslyn (XC72993, ML71054421). It is unclear whether these urban and suburban observations reflect a recent expansion into the city or merely increasing field knowledge among observers.

Species ecology

Habitat requirements and habits

Grey-olive Greenbuls in Kenya have been reported to occupy altitudes of 500–1500 m in areas with 250–1000 mm of rainfall annually (Lewis & Pomeroy 1986). Based on presence in the Loresho area of Nairobi, this altitudinal range can be extended upwards to 1800 m, while presence in the wet areas of Embu and Meru, extends the occupied rainfall regime upwards to almost 1500 mm annually (Brown & Britton 1980). Elsewhere, within its African distribution, similar altitudinal ranges of 400–1900 m are provided by Keith *et al.* (1992) and Fishpool & Tobias (2017), while presence around Amani in northern Tanzania suggests a climate with almost 2000 mm of annual rainfall is acceptable for this species (Britton 1980, Brown & Britton 1980).

Forested waterside habitats and, in particular, permanently flowing streams and rivers, are well known to be favoured by Grey-olive Greenbuls both within Kenya and elsewhere in its African range (Keith *et al.* 1992, Zimmerman *et al.* 1996). Of the sites where it occurs in Kenya, many are also characterized by steep ground, including gullies, steep valleys and gorges, which are often as damp as streamside habitats due to groundwater seepage. Less clearly identified is that foraging substrates favoured by this greenbul are also typically moist or wet, which may be an important habitat requirement for this partly terrestrial species. Field observations in Kenya and elsewhere appear to bear this out. For example, at Kiambu it is regularly seen foraging around the base of waterfalls within forest (F. Ng'weno, pers. comm.), or at Thika and Sultan Hamud where it is known to forage from similarly moist substrates such as exposed root masses, boulders, or mud banks at the water's edge (Nalianya 2000, JB, pers. obs., B. Finch, pers. comm.). To the south of Kenya, in Zambia, logs that have fallen over streams or ravines are especially favoured (Keith *et al.* 1992).

Breeding seasonality

Despite its resident status, the Grey-olive Greenbul was not recorded as breeding in Kenya until 1976, when adults and an unspecified number of fledged young were observed at Thika in December of that year (Lewis & Pomeroy 1986). Four subsequent field observations show additional breeding phenology for this species: an adult photographed feeding two young nestlings (<6 days old) in Kiambu on 21 November 2010 (P. L'Hoir, pers. comm.), a recently fledged, but almost independent juvenile captured by a Little Sparrowhawk *Accipiter minullus* in Loresho on 1 February 2012 (JB, pers. obs.), adults observed feeding recently fledged young in Kiambu on 17 July 2013 (F. Ng'weno, pers. comm.), and a pair photographed building a nest in Karura Forest on 7 June 2014 (S. Carter, pers. comm.).

In the central highlands at least, these combined observations point to nest initiation during both the short (November–December) and long (April–June) rains, with young typically fledging as the wet seasons transition to dry (December–January or June–July). From recorded nesting dates outside Kenya, it appears this reproductive cycle may be initiated 1–2 months later than birds in the core of the species' range to the south. In Zambia, nesting is reported in September–November and in Malawi in August–November, with an apparent absence of nesting records in December or June–July (Fishpool & Tobias 2017).

Conclusions

As the Grey-olive Greenbul has become better known in Kenya, it has been found more widely than was previously known and is not uncommon in some areas. Based on current knowledge, the status and distribution of this species in Kenya can be summarized as follows:

> "Widespread, but often local east of the Rift Valley in central, southern and coastal Kenya, inhabiting evergreen forest understorey along streams, in ravines, gorges and steep valleys with abundant groundwater seepage. Fairly common to uncommon from 700–1800 m in the central highlands in areas with some relief and moderate rainfall, favouring the many drainages flowing south and east from the Aberdare Mountains, Mount Kenya and Nyambeni Hills. Similarly not uncommon from 1000–1500 m in isolated highlands southwards including at Sultan Hamud, Makueni County, the Taita and Sagalla Hills, as well as on the northern slopes of Mt. Kilimanjaro. Much less widespread in southern arid areas below 1000 m, where apparently associated with only the spring-fed Tsavo River and groundwater forest at Taveta. Scattered and poorly defined presence in the humid coastal hinterlands from the Rabai area southwards."

While the habits and foraging ecology of the Grey-olive Greenbul are well recorded in the literature, the observation that year-round moist or wet habitat features are an important requirement for foraging has not been previously established. This requirement almost certainly explains the association with surface groundwater, which typically provides moisture throughout the year (unlike seasonal rainfall), and accounts for the species' "curiously fragmented" distribution, as noted by Britton (1980). It may also shed some light on how it coexists with the congeneric Terrestrial Brownbul *Phyllastrephus terrestris* and Placid Greenbul *Phyllastrephus placidus*, in limited areas of sympatry such as in Meru National Park or Nairobi.

In light of this review, dedicated searches should reveal the presence of this shy greenbul in forested environments elsewhere in central and southern Kenya, particularly where there is steep terrain characterized by surface-exposure of the water table and groundwater seepage. It should be sought in the little visited hill country of the Kitui area, at Mt Kasigau, Ol Donyo Orok and Umani Springs in the foothills of the Chyulu Hills.

Acknowledgements

I am grateful to Simon Carter, Brian Finch, Patrick L'Hoir, Fleur Ng'weno and Fiona Reid for making their field observations available through personal correspondence. David Guarnieri and Isaac Kilusu kindly made their audio recordings and/or photographs available online, while useful information and suggestions from David Bradley, Phillip Bradley, Darcy Ogada and Don Turner are appreciated. I am also grateful for a very helpful review of this paper by Luc Lens, which greatly improved the final draft.

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Scopus 38(1): 1–5, January 2018
Received 9 October 2017

Scopus 38(1): 6–15, January 2018

Flock size, diet composition, and habitat characteristics of the Ethiopian endemic Ankober Serin *Crithagra ankoberensis*

Abebayehu Dessalegn, Mundanthra Balakrishnan and Tilaye Wube

Summary

A study on the flock size, diet composition, and habitat characteristics of the Ankober Serin *Crithagra ankoberensis* was carried out at Simien Mountains National Park (SMNP) and Guassa Community Conservation Area (GCCA) between July 2014 and February 2016. The highest and lowest mean flock sizes were 130 (at SMNP) and 16 (both SMNP and GCCA), respectively. Flock size showed significant seasonal variation at both study sites. The dry and wet season mean flock sizes were 84.3 and 47.6 (SMNP), and 61.1 and 39.2 (GCCA). Flock size did not show significant variation at the two study sites. At both study sites the diet was dominated by leaves (80%) and seeds (90%) during the wet and dry seasons, respectively. Insects contributed about 10% and 3% of the diet during the wet season at GCCA and SMNP, respectively. Mosses contributed <3% of the diet at both study areas. A total of 39 plant species were recorded in Ankober Serin flocking sites. Of these, 29 and 22 were restricted to SMNP and GCCA, respectively, while 12 (31%) were shared. The habitat was dominated by herbs (53%–96%) with some portions of bare earth (4%–34%). The vegetation height was predominantly short (<30 cm) with estimated percentage proportions of 65%–77%, while tall (>60 cm) vegetation was less frequent (3.6%–9.7%). These habitat characteristics can be used as indicators of the presence of Ankober Serin.

Keywords Ankober Serin, Guassa Community Conservation Area, Simien Mountains National Park, flock size, habitat, diet composition

Introduction

Ankober Serin *Crithagra ankoberensis* is an Ethiopian endemic discovered in 1976 by John Ash (Ash 1979). Ash placed it under the genus *Serinus* and later it was grouped under *Carduelis* (Perlo 2009). A comprehensive taxonomic study of true finches by Zuccon *et al.* (2012) using nuclear and mitochondrial DNA sequencing suggested that the genus *Serinus* is polyphyletic and should be restricted to six species—*S. alario, S. canaria, S. canicollis, S. pusillus, S. serinus* and *S. syriacus*, while the remaining species including Ankober Serin should be placed under the reinstated genus *Crithagra.*

The holotype specimen was collected 3 km north of Ankober at an elevation of 2980 m. The distribution range of the species is not fully known. So far, it has been recorded from five locations in central and northern Ethiopia along the eastern escarpments of the central highland chains and the Simien Mountains at altitudes of 2800–4300 m (Vivero Pol 2001, van Perlo 2009). The distribution range includes: Ankober and the nearby areas such as Goshmeda, Kundi, and Debre Sina, Koreta in Guassa, Deneba, Abune Yosef Mountain in north Wollo, and Cheneke Camp and

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Bhawit in Simien Mountains National Park (BirdLife International 2016). The species is also believed to be distributed in similar habitats along the eastern escarpments from Ankober to the Simien Mountains, specifically at Abuye Meda, Amba Farit, Guna and Choke Mountains (BirdLife International 2016).

Ankober Serin is a gregarious species, roosting and feeding in groups of up to 60 individuals. It is commonly seen mixed with Streaky *S. striolatus* and Brown-rumped *S. tristriatus* seedeaters (Vivero Pol 2001, BirdLife International 2016). These two species and *S. nigriceps* were observed by Ash at Ankober (Ash 1979). It feeds on grass and other seeds amongst lichen-covered rock as well as areas of open earth, while it is not seen on uncultivated land (Vivero Pol 2001). It is active and restless, and spends most of its time on rocks (Vivero Pol 2001). Breeding takes place between September and March; however, it is believed to reproduce during any time of the year following heavy rains (Ash 1979).

It has a restricted habitat preference for near vertical cliffs, and steep and vegetated slopes. It perches on lichen-covered rocks, bare earth, and short grazed pasture (Vivero Pol 2001). Over 40 species of plants were identified from their habitat at Ankober with the most common including, *Rumex nervosus*, *Alchemilla* spp., *Trifolium* spp., *Sida ternata*, *Erica arborea*, *Thymus serpyllum*, *Hebenstretia dentata*, *Scabiosa columbaria*, *Helichrysum* spp., *Pennisetum* spp., and *Androgon* spp. while the breeding area is dominated by *E. arborea* (Ash 1979).

Their IUCN Red List status is Vulnerable. Their main threat is habitat loss due to grazing and agricultural expansion (BirdLife International 2016).

Detailed knowledge of the ecology and population status of this species is not available due to a lack of research. The only available information on the species is limited to reconnaissance surveys and short-term observation records (See references in BirdLife International 2016). Therefore, this study contributed to the limited field data on Ankober Serin flock size, diet composition, and habitat characteristics based on a long-term study at two of its main distribution sites — Guassa Community Conservation Area (GCCA) and Simien Mountains National Park (SMNP).

Study areas

SMNP

Simien Mountains National Park (SMNP) is located within Amhara National Regional State, northeast of Gondar Town (13°01′–13°29′N and 37°50′–38°34′E; altitude 1900–4430 m). It is 886 km away from the capital Addis Ababa and 123 km from Gondar Town (Fig. 1A). SMNP is characterized by high plateaus, grassy plains, steep escarpments, deep gorges and sharp cliffs that resulted from heavy erosion of Trappean basalt layers (Mohr 1962). Rainfall is bimodal comprising two wet seasons from February to March, and from July to September, with mean annual precipitation of 1550 mm. SMNP is characterized by low temperatures. Minimum temperatures range between 2.5–4° C while the maximum is 18° C. There are often dry winds during the day, frosts may occur at night, and snow sometimes settles on the summit of Ras Dashen, elevation 4533 m (Hurni 1986, Magin 2001).

The vegetation at SMNP is considered as part of the Afro-alpine centre of plant diversity, with high levels of endemism due to past isolation. However, the diversity is low compared with other Afro-alpine regions due to the post-volcanic and post-glacial history (Magin 2001). Some of the plant species endemic to SMNP are stonecrop *Rosularia simiensis* and tussock grass *Festuca gilbertiana*. SMNP is home to 22 species

of large and medium-sized mammals including endemics, Walia ibex *Carpa walie*, Gelada baboon *Theropiticus gelada* and Simien fox *Canis simensis* (Puff & Nemomissa 2001, SMNP & EWCA 2013). Avian fauna diversity is estimated at over 180 species with five endemics (Hillman 1993, SMNP & EWCA 2013).

GCCA

Guassa Community Conservation Area is in the central highlands of the Rift Valley escarpment in North Shoa Zone, Gera–Keya Woreda of Amhara National Regional State (10°15′–10°27′N; 39°45′–39°49′E; altitude: 3200–3700 m). GCCA is 265 km northeast of Addis Ababa (Fig 1B).

Rainfall is bimodal with a long wet season from the end of June until September, and a short wet season in March and April. Mean annual precipitation and temperature is 917 mm and 12.8° C, respectively. Temperatures range from 7°C to 26° C (EWNHS 1996, Tefera *et al.* 2012). The topography is characterized by hills and valley bottoms interspersed with swamps and open areas of montane and Afro-alpine grassland. Dominant plant species are *Hagenia abyssinica*, *Olea europaea* subsp. *cuspidata*, *Juniperus procera*, *Podocarpus falcatus*, *Allophyllus abyssinicus*, *Festuca* spp., *Erica arborea*, *Hypericum revolutum*, *Lobelia* spp., and *Thymus* spp. (Tefera *et al.* 2005).

GCCA shares two iconic endemic mammals, the Gelada baboon and Simien fox, with SMNP. Other endemic mammals found in GCCA are Abyssinian hare *Lepus starcki*, Unstriped grass rat *Arvicanthis abyssinicus* and Abyssinian meadow rat *Stenocephalemus grisecauda* (SMNP & EWCA 2013). GCCA is also home to 26 highland biome bird species. Of these, Spot-breasted Lapwing *Vanellus melanocephalus*, Rouget's Rail *Rougetius rougetii*, Abyssinian Longclaw *Macronyx flavicollis*, and Black-headed Siskin *Serinus nigriceps* are endemic to Ethiopia (EWNHS 1996).

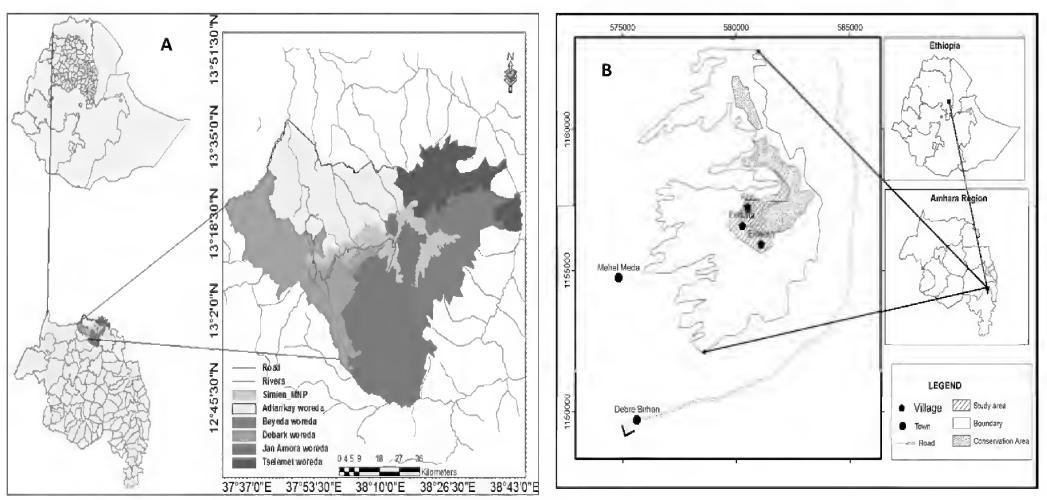

Figure 1. Map of Simien Mountains National Park (A) and Guassa Community Conservation Area (B).

Materials and methods

Flock size

An extensive search of Ankober Serin flocking sites was carried out at both study areas for more than 20 days. Finally, five flocking sites were selected at each of the study areas. Flocking sites were separated by a minimum of 1 km. Flock counts

were conducted during both dry and wet seasons between 2014–2016 (Wet season: July–August 2014 and 2015; Dry season: January–February 2015 and 2016). Each counting session lasted for three consecutive days in each season. Flock counts were conducted between 06:00 and 08:00. The first author and a trained field assistant conducted flock counts simultaneously to increase accuracy of the count. If there were significant variations, the counting was conducted again. Averages of the counts by both observers were recorded when the difference between the two counts were insignificant i.e. ≤5 birds.

Diet composition

Undigested remains in faecal droppings were used to determine diet composition. Fresh faecal samples were collected from two flocking sites in each of the study areas. Selection of the sites was determined based on their accessibility. Sites that were located on very steep slopes were excluded. A minimum of 10 fresh faecal droppings were collected from each of the flocking sites at both study areas during dry and wet seasons. Faecal samples were collected just after dropping to make sure they belonged to the serins. Diet composition was studied following the quantitative method of Robinson (2004). Pellets were stored in 70% ethyl alcohol until they were analysed using a 20x binocular microscope. First, the pellets were dissolved in 3 ml of water and the contents were determined using a point-quadrat method. For each sample, 0.1 ml of the suspension was mounted on a shallow-welled microscope slide. This was then placed over a grid of 72 points and the type of food item falling on each grid point was identified. This procedure was repeated five times for randomly selected, non-overlapping areas of the slide, resulting in a total of 360 grid positions counted for each sample.

Habitat analysis

Vegetation analysis of Ankober Serin habitats was conducted following Wiens & Rotenberry (1981). The same flocking sites used for diet analysis were included in the habitat analysis and these were designated as GCCA I, GCCA II, SMNP I, and SMNP II. Vegetation sampling points with a diameter of 4 m were established in each site. The number of sampling points ranged between 12 and 60, based on the size of the flocking site. The following four vegetation parameters were recorded at each sampling point:

I. *Composition*–plant species within a 2 m radius of the sampling points were recorded. Photographs of plants that could not be identified in the field were taken for later identification at the National Herbarium, Addis Ababa University.
II. *Structure and ground cover*–the vegetation structure (growth form) at each sampling point was categorized either as shrub or herb, and the ground cover was categorized as shrub, herb, or bare earth. The dominant growth form and ground cover was determined based on a visual assessment (Sutherland 2004).
III. *Height*–the highest stratum at each sampling point was measured using a measuring tape. Vegetation height was categorized as short (<30 cm), medium (30–60 cm), or tall (>60 cm). Based on the number of sampling points falling within each category, a percentage was calculated.

Statistical analysis

Pair-wise t-tests were used to compare flock sizes between wet and dry seasons. An independent sample t-test was used to compare the total bird counts between GCCA and SMNP. Levels of significance were based on 95% confidence rates. Analyses were conducted on SPSS ver. 17.

Results

Flock size

Mean flock size was higher during the dry season than the wet season in both GCCA (61.1 vs 39.2) and SMNP (84.3 vs 47.6). The seasonal variation in flock size at the two study areas was statistically significant ($p=0.046$ at GCCA and $p=0.021$ at SMNP) (Fig. 2 A & B). The highest mean flock size ($n=130$) was recorded from SMNP flocking site (SF5) while the lowest ($n=16$) was recorded from both GCCA (GF5) and SMNP (SF3) (Fig.2 A & B).

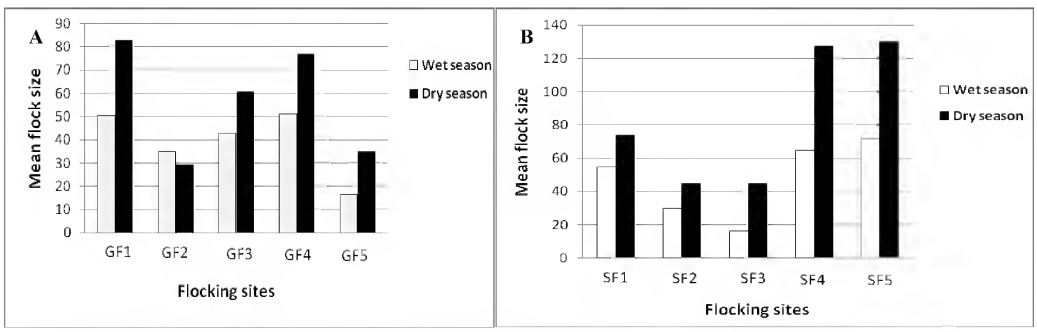

Figure 2. Mean flock size during the wet and dry seasons at GCCA (A) and SMNP (B) (GF = GCCA flocking site; SF = SMNP flocking site).

The highest total mean number of birds was recorded during the dry season at SMNP ($n=421.5$) while the lowest was during the wet season at GCCA ($n=196$). SMNP had a higher total number of birds during both seasons than GCCA, but the difference was not statistically significant ($p=0.52$ wet season, $p=0.31$ dry season) (Fig. 3).

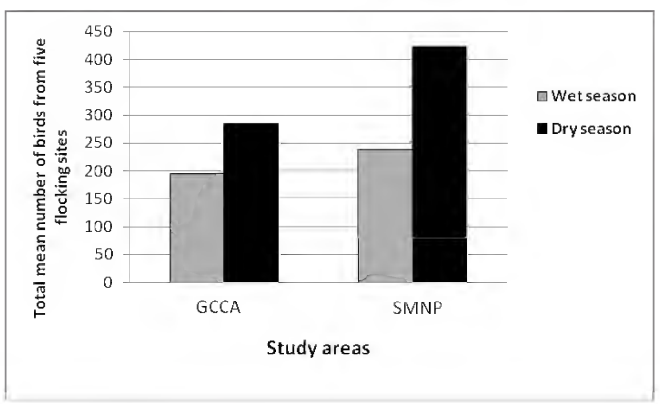

Figure 3. Total mean number of birds from five flocking sites during wet and dry seasons at GCCA and SMNP.

Diet composition

Diet composition showed a similar pattern at both GCCA and SMNP. Leaves and seeds significantly dominated the diet during the wet and dry seasons, respectively. Leaves represented 80% of the diet during the wet season, while seeds represented 90% during the dry season (Fig. 4). Insects and mosses combined made little contribution (≤10% per season) and they were relatively more common in the wet season than the dry season (Fig. 4).

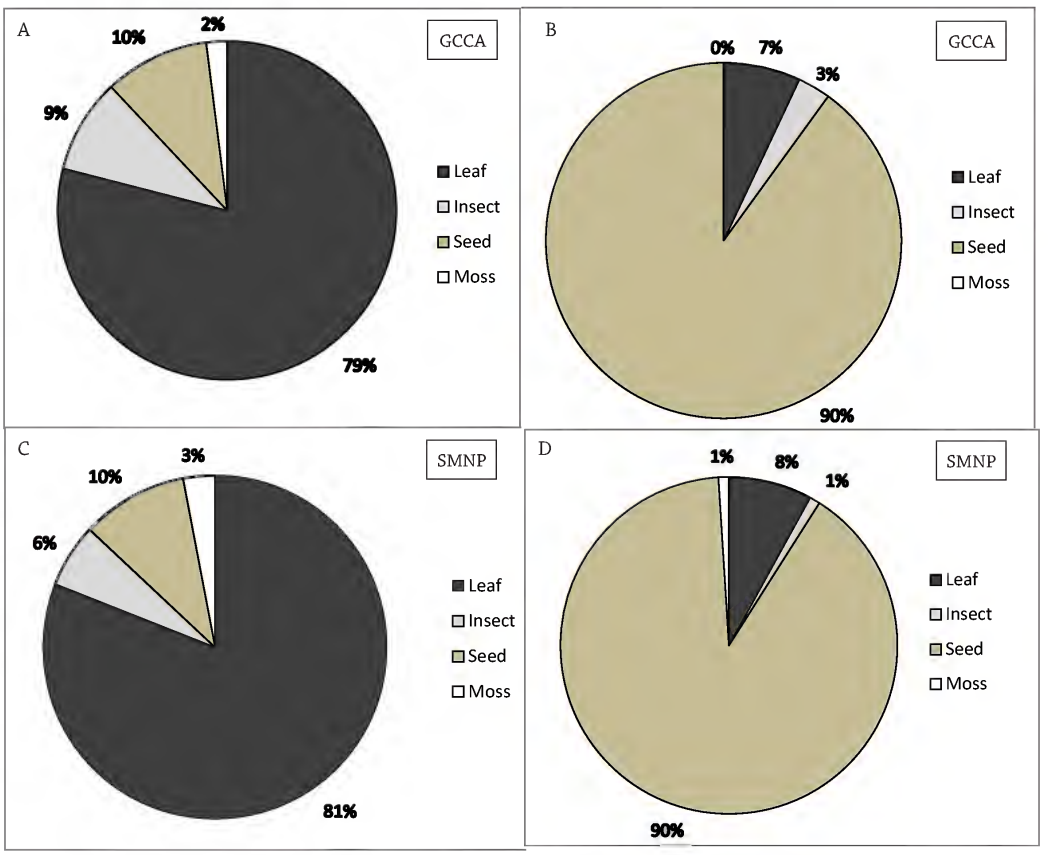

Figure 4. Proportion of diet items during the wet (A & C) and dry (B & D) seasons at both GCCA and SMNP.

A total of 39 plant species were identified from Ankober Serin habitats in GCCA and SMNP. Of these, 29 were recorded in SMNP and 22 at GCCA. The two areas shared 12 species (31%) of the total, n = 39 (Table 1).

Ground cover showed a similar pattern in all flocking sites. Herbs dominated in each site (53%–96%), while shrubs had the least coverage (0–13%; Table 2).

Table 1. Plant species recorded from Ankober Serin *Crithagra ankoberensis* flocking sites at GCCA and SMNP.

No.	Species name	GCCA	SMNP
1	*Aeonium leucoblepharum*	x	x
2	*Agrostis quinquesta*		x
3	*Agrostis sclerophylla*		x
4	*Alchemilla abyssinica*	x	
5	*Alchemilla bachitii*		x
6	*Andropogon spp*	x	x
7	*Bidens macroptera*		x
8	*Carduus schimperi*	x	x
9	*Carex spp.*	x	x
10	*Cerastium octandrum*		x
11	*Crassula alba Forssk*	x	x
12	*Crassula schimperi*		x
13	*Cynodon Spp.*	x	
14	*Cynoglosum coeruleum*	x	x
15	*Dianthoseris schimperi*	x	x
16	*Euphorbia schemperi*		x
17	*Euryops pinifolius*	x	
18	*Festuca macrophylla*		x
19	*Galium simense*	x	
20	*Helichrysum citrispinum*		x
21	*Helichrysum splendidum*	x	
22	*Haplocarpha schimperi*	x	
23	*Hypericum revolutum*		x
24	*Kniphofia foliosa*	x	x
25	*Lobelia rhyncopetalum*		x
26	*Myosotis vestergrenii*		x
27	*Plectranthus lanuginosus*	x	
28	*Primula verticillata*		x
29	*Ranunculus schimperi*	x	x
30	*Rumex steudelii*	x	
31	*Sagina afroalpina*		x
32	*Salvia merjamie*	x	x
33	*Satureja pseudosimensis*		x
34	*Satureja punctata*	x	
35	*Satureja simensis*	x	x
36	*Senecio nanus*		x
37	*Thymus schimperi*	x	x
38	*Thymus serrulatus*		x
39	*Utrica simensis*	x	

Table 2. Proportion of ground cover of Ankober Serin *Crithagra ankoberensis* habitats at GCCA and SMNP.

Flocking sites	Herbs	Shrubs	Bare earth
GCCA I	53%	13%	34%
GCCA II	75%	2%	23%
SMNP I	96%	0%	4%
SMNP II	69%	8%	23%

Short vegetation height dominated in all of the four sampled flocking sites (65%–77%), followed by medium height (19%–24%; Table 3).

Table 3. Proportion of vegetation height categories at Ankober Serin *Crithagra ankoberensis* flocking sites.

	Height category		
Flocking sites	Short (< 30 cm)	Medium (31–60 cm)	Tall (> 60 cm)
GCCA I	77. 1%	19.2%	3.6%
GCCA II	74.7%	19.7%	5.6%
SMNP I	75.1%	19.2%	5.7%
SMNP II	65.6%	24%	9.7%

Discussion

The present study documents the highest flock size (n = 130) compared to previous records of n = 15 (Ash 1979) and n = 60 (Vivero Pol 2001). Seasonal variation in flock size has also been reported in other species (Delestrade 1994, South & Pruett-Jones 2000, Sundar 2006). However, some species also show non-variable flock size over a long period (Ervin 1977). Food availability appears to be the main factor that governs foraging flock size. In sparrows that feed on barely seeds, the optimum flock size, also called equilibrium flock size, was determined by the size of a foraging patch that has the densest seeds and the density of seeds outside of this patch (Barnard 1980). A similar influence of food availability on flock size was suggested for the Asian Openbills *Anastomus oscitans* (Sundar 2006). Flock size is also correlated with the amount of energy intake. Goldfinches *Carduelis carduelis* consume more food in larger flocks than when they are foraging solitarily by minimizing the time spent on vigilance and increasing their rate of pecking (Glück 1986). Flock size variation is also related to the breeding season. Monk Parakeets *Myiopsitta monachus* showed a decrease in flock size at the beginning of the breeding season (beginning of spring) and an increase in the fall and early winter (South & Pruett-Jones 2000). The observed seasonal variation in flock size in Ankober Serin could be assumed to be influenced by the breeding season. The species breeds after heavy rains (Ash 1979). Thus, if breeding has the same influence on flock size as observed in Monk Parakeets, the decreased flock size during the wet season might be as a result of breeding activities. However, the effect of forage density on flock size needs to be investigated in future studies.

Previous studies have shown that variation in the diet of birds can be affected by breeding status (Molokwu *et al.* 2011), migration (Bolser *et al.* 2013), and food availability (Karmiris 2017). The dietary shift of Ankober Serin between leaves (wet season) and seeds (dry season) might be explained by the latter. It also appears that Ankober Serin consumes insects opportunistically as a source of animal protein.

The number of plant species recorded from GCCA and SMNP is almost the same as recorded by Ash (1979). However, some of the commonly occurring species described in Ash (1979) including *Trifolium* spp., *Sida ternate*, *Hebenstretia dentate*, and *Scabiosa columbaria* were absent. Ash also indicated *Erica arborea* as the dominant plant species at the breeding site of Ankober Serin. In the present study, *E. arborea* was not recorded in the flocking sites, but it was observed outside of them.

Our results revealed an association of Ankober Serin flocking sites with short plant heights (< 30 cm) that are dominated by herbs with some proportion of bare earth and shrubs. These habitat features can be used as indicators of the presence of Ankober

Serin in future studies and surveys. We recommend protection of these habitats as part of future conservation actions for Ankober Serin.

Acknowledgements

The following are duly acknowledged: Addis Ababa University for providing graduate research fund to AD; Yilma Delelegn for providing valuable literature; Getahun Mesele and Melaku Wondafrash for plant species identification; staff of SMNP and GCCA particularly Abebe Gossim for assistance with fieldwork; Ethiopian Wildlife Conservation Authority for permission to conduct the study.

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Scopus 38(1): 6–15, January 2018
Received 12 October 2017

Scopus 38(1): 16–23, January 2018

Some noteworthy distributional records from the Gwassi Hills area, Homa Bay County, Kenya

James Bradley

Summary

A preliminary inventory of birds occurring in the Gwassi Hills area was compiled by Bradley *et al.* (2015), following surveys between 2011 and 2014, which focused on sub-montane forest (1800–2000 m). Here I detail a number of additional interesting distributional records made principally in montane forest (above 2000 m) and foothill woodlands (1200–1600 m) during birding visits to the area in October 2015, October 2016, March 2017 and November 2017.

Keywords East Africa, forest birds, distribution, inventory, conservation

Introduction

Unfortunately, very few observers currently visit the Gwassi Hills region, and the little indigenous habitat remaining continues to undergo significant clearance and/or modification in the absence of sustained outside interest (Fig. 1). A distinct habitat type of particular concern is the very small area of humid montane forest above 2100 m on the highest ridges and summit of the Gwassi Hills, now almost completely destroyed. Undoubtedly, several of its avian inhabitants have already been extirpated or irretrievably diminished in number. Species accounts below follow the nomenclature and taxonomy of the *Checklist of the Birds of Kenya* (EANHS 2009).

Figure 1. Terrain map of the western parts of Migori and Homa Bay Counties, including locations mentioned in the text.

Species accounts

Ayres's Hawk Eagle *Aquila ayresii*

Two individuals (a presumed pair) of this distinctive forest raptor were closely observed soaring over the main ridge at 2200 m in the Gwassi Hills on 28 October 2015. One adult was a very pale morph, with a white head and black 'teardrop' through the eye, while the second bird was a more typical dark morph individual, heavily speckled with black

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underneath, and with white restricted to just the throat and chest. This individual was photographed and the identification is supported by B. Finch (pers. comm.). A pale morph individual was observed again at the same location on 27 March 2017. In western Kenya this eagle is known from areas to the east around the Mau highlands (Zimmerman *et al.* 1996) as well as from the Kakamega–Nandi area 120 km to the northeast (Lewis & Pomeroy 1989).

Levant Sparrowhawk *Accipiter brevipes*

An immature of this species was seen well and photographed at 1150 m in the western Gwassi foothills at Nyangwethe on 29 October 2016 (Fig. 2). It was noted to have heavily barred underwings and tail, spotted flanks, a streaked breast and thin central throat stripe, and all three observers (S. Carter, T. Davis and the author) agreed on the identification. The appearance of the bird in circling flight was of a long—though fairly pointed-winged—accipiter, superficially resembling a Eurasian Kestrel *Falco tinnunculus* in shape. The identification was supported by D. Forsman (pers. comm.) who notes a wing-formula and dusky primary fingers, which are diagnostic for this species. This is a scarce species in Kenya, although recent reports of multiple migrating birds in western Kenya and nearby Tanzania suggest it may occur more regularly than records suggest.

Figure 2. An immature Levant Sparrowhawk *Accipiter brevipes* in flight over the Gwassi foothills at Nyangwethe, 29 October 2016 (photo: Simon Carter).

Buff-spotted Flufftail *Sarothrura elegans*

A single, distant bird, was heard at 2200 m in the Gwassi Hills on 28 October 2015. An audio recording of the bird, albeit of poor quality, permits certain identification and has been confirmed as this species by D. Turner (*in litt.*). The nearest records of this species in western Kenya come from Kakamega Forest 120 km to the northeast (Zimmerman 1972), and it may only be a seasonal visitor to the Gwassi Hills.

Swamp Nightjar *Caprimulgus natalensis*

This species was audio recorded in Ruma National Park on 22 February 2012 by D. Bradley and the author, though the record has been unpublished until now. The calls included a steadily repeated "chuk" note and a short churring phrase ending in a series of lower bubbly notes, both vocalizations matching well with the known voice of this nightjar. These audio recordings have been deposited at www.xeno-canto.org (id# 101209 and 101210). South of the Winam Gulf, this species was first recorded in the Serengeti–Mara ecosystem of northern Tanzania and southern Kenya in 2005–2007 (Kilpin 2011), and our records document an additional site where the species occurs between this distribution and the formerly known Kenyan range to the north of the Winam Gulf (Zimmerman *et al.* 1996).

Freckled Nightjar *Caprimulgus tristigma*

A single individual was audio recorded singing from steep and rocky slopes at 1500 m in the Gembe Hills on 27 November 2017. This record represents a first occurrence in the Kenyan Lake Victoria basin and the audio recording has been deposited at www.xeno-canto.org (id# 395924). Elsewhere in western Kenya, this nightjar is readily found 100 km eastwards in the western Maasai Mara (JB, pers. obs).

Figure 3. Pallid Honeyguide *Indicator meliphilus* perched in a large tree in remnant sub-montane forest in the Gwassi Hills, 29 October 2016 (photo: Simon Carter).

Pallid Honeyguide *Indicator meliphilus*

The distinctive "fwee...fwee...fwee'ep....." call of this species was first heard in riverine forest at 1150 m at Nyangwethe on 30 October 2015 and was also heard in riverine figs outside the Kamato Gate of Ruma National Park on 25 November 2017 (JB pers. obs.), though the bird was not seen. It has only been seen and photographed on one occasion in remnant sub-montane forest at 1750 m in the Gwassi Hills on 29 October 2016 by S. Carter (Fig. 3). The squat appearance, short stubby bill, pale underside and absence of a dark malar stripe are all evident from the photograph and the bird was confidently identified as this species. Pallid Honeyguide is unknown from elsewhere in the Kenyan Lake Victoria Basin, but does occur in the western Maasai Mararegion 110 km to the southeast (T. Davis pers. comm.).

African Grey Woodpecker *Dendropicos goertae*

This species is known to occur in the Lake Victoria basin (Zimmerman *et al.* 1996), but the subspecies involved to the south of the Winam Gulf has been unclear in the literature. Following recent observations in Homa Bay (S. Carter pers. comm.), and the western foothills of the Gwassi Hills (JB pers. obs.), birds in this part of Kenya can be confidently assigned to the race *D. g. centralis* and not the highland occurring, *D. g. rhodeogaster* (considered separately as Highland Grey Woodpecker by some), on the basis of a paler grey head and underparts, and the absence of a red wash on the belly of the male.

Brown-backed Woodpecker *Picoides obsoletus*

This local and scarce species was found at 1250 m in *Acacia* woodland at the Ruma National Park Nyatoto Gate on 25 November 2017 (Fig. 4). A second individual was found on the following day in mixed woodlands at 1400 m in the eastern Gwassi foothills. Zimmerman *et al.* (1996) map an isolated record of this woodpecker from 75 km to the northeast at Kisumu but the species appears to be rare in the Kenyan Lake Victoria basin, and observations around the Gwassi Hills likely refer to a small but resident population.

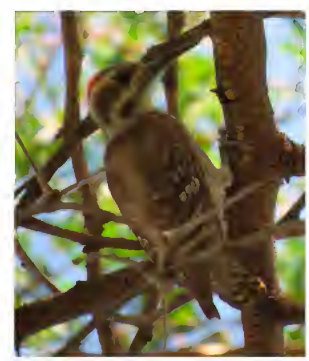

Figure 4. A male Brown-backed Woodpecker *Campethera caroli* at the Ruma National Park Nyatoto Gate, 25 November 2017 (photo: James Bradley).

Grey Cuckooshrike *Coracina caesia*

Unseen birds were audio-recorded in closed canopy forest at 2200 m on the Gwassi Hills on 28 and 29 October 2015. The calls include chattering and high pitched "tsip-tsip" and "sueeet" notes typical of this species, as well as a very high and descending "peeeooooo" call, which is otherwise known only from birds in South Africa (Zimmerman *et al.* 1996; e.g. id# 313513 at www.xeno-canto.org). It was not found in November 2016 by which time most forest habitat at the site had been felled, though it is possible the birds were only visitors to the Gwassi Hills as the species is known to make local movements elsewhere in its' African range (Keith *et al.* 1992). Audio recordings have been deposited at www.xeno-canto.org (id# 313513 and 316139), and these records represent a range extension of roughly 110 km from the nearest known populations in the western Maasai Mara (Macaulay Library photo #58001021; S. Carter) and Nandi Forests (Zimmerman 1972).

Figure 5. One of a pair of Rock-loving Cisticolas *Cisticola aberrans* found atop a rocky knoll in the lower Gwassi Foothills, 31 October 2015 (photo: James Bradley).

Rock-loving Cisticola *Cisticola aberrans*

This species was reported in Bradley *et al.* (2015) from the Gembe Hills on the basis of audio recordings of unseen birds, and was extensively audio recorded at the same location on 27 November 2017 (id# 395937-395942 at www.xeno-canto.org). On 31 October 2015, a pair was well observed and photographed in the western Gwassi foothills at 1320 m (Fig. 5). They were found at the top of a small knoll inhabiting shrubs and small trees surrounding a large exposed granite outcrop, and responded aggressively to tape of this species' song and calls made in the Sitebe Mountains in west Tanzania (audio recording by D. Moyer). The subspecies here, *C. a. emini*, is considered separately from those of southern Africa by Gill & Donsker (2017), which may be warranted on the basis of consistent vocal differences. It is probably a locally uncommon species in any rocky habitat between the Gwassi Hills and its nearest known site of occurrence 100 km eastwards in the Maasai Mara (Finch 1987).

Pale Wren Warbler *Calamonastes undosus*

A bird was briefly seen and audio recorded at 1270 m in the eastern Gwassi foothills on 26 March 2017 and again at 1300 m in the Gembe foothills on 28 November 2017. The first bird was found in an area of open woodland on lightly grassed rocky slopes with a gentle to medium gradient, where it was briefly observed flitting between the tops of thickly foliaged trees. In flight it appeared quite dark, similar to a Grey-backed Camaroptera *Camaroptera brachyura*, and was likely of the nominate race. Audio recordings of this individual, as well as [possibly] a second individual, have been deposited at www.xeno-canto.org (id# 363170 and 364255). The calls noted in the field were similar to those of Lesser Honeyguide *Indicator minor*, but slower and with a variable rhythm and clicking quality. This record represents a 95 km range extension to the northwest of the nearest known population around Lolgorien (Zimmerman *et al.* 1996).

Cinnamon Bracken Warbler *Bradypterus cinnamomeus*

An unseen bird in thick secondary growth at 2100 m in the Gwassi Hills repeated a characteristic song phrase three times after a heavy rain shower on 27 October 2015, and was independently identified by D. Chesire and the author. The song was typically loud and punchy, consisting of three introductory notes, followed by a higher pitched trill… "TCHU-TCHU-TCHU-treeeeeeee". A second bird was heard at 2200 m the following day singing the same phrase, but with only two introductory notes, while another was audio recorded making the nasal and camaroptera-like "peeet" call (id# 316684 at www.xeno-canto.org). Elsewhere, this upper montane forest species has been known from the Kisii area approximately 80 km to the east, as well as the North Nandi Forest 120 km to the northeast (Lewis & Pomeroy 1989).

Brown Woodland Warbler *Phylloscopus umbrovirens*

Unseen birds were audio-recorded in forest at 2100–2200 m on 28 and 29 October 2015. The voice, though weak for this species, includes the typical mixed and stuttered phrases of high thin whistles and wandering trills, while the call of repeated see-sawing "tee-too" notes is noticeably *Phylloscopus*-like. The audio recordings have been confirmed as this species by B. Finch (pers. comm.), and are deposited at www.xeno-canto.org (id# 313530 and 319249). It was not found in November 2016, by

which time most forest habitat at the site had been felled. The nearest known populations of this upper montane forest species are known from the Nandi Forests and the Mau highlands, both more than 120 km from the Gwassi Hills (Zimmerman *et al.* 1996).

Green-capped Eremomela *Eremomela scotops*

Two birds were closely observed foraging in a leafy *Ficus* sp. at 1270 m in the eastern Gwassi foothills on 26 March 2017. The yellow-green head and throat, and whitish belly suggested the birds were of the expected western race *E. s. citriniceps*, and a photograph was obtained (Fig. 6). This is a scarce species in Kenya, with records of this subspecies from the Maasai Mara (Zimmerman *et al.* 1996), an old specimen from Kendu Bay, 50 km to the northeast (Lewis & Pomeroy 1989, D. Turner pers. comm.), and a more recent record from the Kavirondo Escarpment 110 km to the northeast (Bradley & Bradley 2014).

Figure 6. One of a pair of Green-capped Eremomelas *Eremomela scotops* foraging in a leafy fig tree in the Gwassi foothills, 26 March 2017 (photo: Nathan Hentze).

African Hill Babbler *Pseudoalcippe abyssinica*

An unseen bird was heard singing clearly from thick forest understorey at 2200 m in the Gwassi Hills on 28 October 2015, and was independently identified by D. Chesire and the author. The song heard was a short version of the typically longer phrases, but the lazy and sweet quality was instantly recognizable as this species. A short audio recording has been deposited at www.xeno-canto.org (id# 316046) and other than an isolated record near Lolgorien, this occurrence comprises a 120 km westerly range extension from the species' known Kenyan range in the forests of the Nandi Hills and Mau highlands (Zimmerman *et al.* 1996). It was not found in November 2016 by which time most forest habitat at the site had been felled.

Figure 7. One of a group of Brown Babblers *Turdoides plebejus* in scrub at Magunga, 29 October 2016 (photo: Simon Carter).

Brown Babbler *Turdoides plebejus*

A group of eight or more birds was observed closely, photographed and audio-recorded at 1300 m near Magunga on 29 October 2016 (Fig. 7). They were seen to be very similar to Arrow-marked Babbler *T. jardineii*, which is fairly common in nearby areas, though with pale, not dark lores, and with a higher pitched, scratchier call quite different from the low and grating call of Arrow-marked. An audio recording has also been deposited at www.xeno-canto.org (id# 344214), and while occurrence south of the Winam Gulf was correctly noted by Lewis & Pomeroy (1989), it was omitted by others, presumably in the absence of specimen evidence.

Mocking Cliff Chat *Thamnolaea cinnamomeiventris*

A male was seen well alongside cliffs and farmland at 2100 m in the Gwassi Hills on 27 March 2017. The bird was first seen in flight and noted to be as large as an African Thrush *Turdus pelios*, with a longer-appearing tail, and an all-black upperside, but for a conspicuous white wing patch. When seen from the front, the underside was mostly a dull rufous, delineated from a black chest and head by an indistinct white line. Elsewhere in western Kenya this species is known from the western Mara escarpment 120 km to the southeast (Zimmerman *et al.* 1996), and from the Maragoli escarpment

100 km to the northeast (D. Turner, pers. comm.). There is also a recent record in the Lake Victoria basin from north-central Tanzania (Werema *et al.* 2017), and a credible report in an internet database from Mfangano Island, 20 km to the northwest of the Gwassi Hills (eBird).

Figure 8. One of a pair of Ashy Flycatchers *Muscicapa caerulescens* foraging in riverine forest at Nyangwethe, 28 October 2016 (photo: Simon Carter).

Ashy Flycatcher *Muscicapa caerulescens*

A pair was observed closely and photographed at 1150 m in the western Gwassi foothills at Nyangwethe on 28 October 2016 (Fig. 8), while a second pair was found in riverine figs immediately outside the Ruma National Park Kamato Gate on 28 November 2017. The birds were found in remnant gallery forest, where they foraged from fairly concealed perches in the mid-storey of large fig trees. This flycatcher is known in southwest Kenya from the Mara River area, 125 km to the southeast (Zimmerman *et al.* 1996) and in Uganda from Mabira Forest, near Jinja, some 160 km to the northwest (Britton 1980), but this appears to be a first record for the northeastern Lake Victoria basin. These birds appeared slightly darker with more slaty tones in comparison with birds seen in coastal Kenya, and can be tentatively referred to the western subspecies *M. c. brevicaudata*.

African Dusky Flycatcher *Muscicapa adusta*

A pair was observed closely in forest edge habitat at 2200 m in the Gwassi Hills on 28 October 2015. All three observers (D. Chesire, Y. Muhingi and the author) concurred on the identification, and an audio recording of the descending spitted call was made (id# 333785 at www.xeno-canto.org). This record represents a 95 km range extension to the northwest of the nearest known population around Lolgorien (JB, pers. obs.).

Black-necked Weaver *Ploceus nigricollis*

This species is known to occur in the north-eastern Lake Victoria basin to the south of the Winam Gulf, though the subspecies present has been unspecified in the literature. On 31 October 2016 a pair of the eastern *P. n. melanoxanthus* was seen well and photographed at Karungu, approximately 20 km south of the Gwassi Hills (Fig. 9). From the photos it is evidently this taxon, and not the expected western nominate form, on the basis of a solid black versus a sepia-brown mantle, and an extensive black bib on the male (typically smaller in nominate birds). The habitat was also more appropriate for this form in being dry scrub and not woodland or forest as favoured by nominate birds. Previously, *P. n. melanoxanthus* has been known from no closer to the Gwassi Hills area than the Lake Natron basin 280 km to the southeast (D. Turner, pers. comm.), although birds reported from nearby Rusinga Island, as well as from Muhoro Bay (M. Coverdale, unpub. data) likely also refer to this form. Of interest, is that Black-necked Weavers of forested and wooded areas above 1600 m in the northwest Maasai Mara, only 110 km to the southeast, appear to belong to the nominate form (JB, pers. obs.).

Figure 9. An adult male Black-necked Weaver *Ploceus nigricollis* of the eastern dry country form *P. n. melanoxanthus* at Karungu, 31 October 2016 (photo: Simon Carter).

Green-backed Twinspot *Mandingoa nitidula*

This species was audio-recorded in streamside undergrowth at 1850 m in the Gwassi Hills on 2 November 2014, though the bird was not seen. The songster remained a mystery until identified with the assistance of B. Finch in 2015. While the sound quality is not good, the stuttered rhythm, drawn out "tseeeuuu", high "tsit" notes and rattled trills making up the song of this species, can be clearly heard. This widespread, but local forest species is known from no closer than Kakamega Forest 120 km to the northeast (Zimmerman 1972), and from the Mara River 125 km to the southeast (B. Finch pers. comm.).

Black-rumped Waxbill *Estrilda troglodytes*

Six individuals were encountered feeding on seeding grasses along the roadside near the northwest gate to Ruma National Park on 26 March 2017, and a photograph was obtained (Fig. 10). In the field they were noted to be similar to Common Waxbill *E. astrild*, but with a pink wash to the underparts, and a black rump and tail, the outermost rectrices being white. This species has previously been reported from the area at the nearby Lambwe River Estuary in November 2016 (W. Wachira, pers. comm.), although the birds were not photographed. These records comprise only a 30 km southerly range extension from the nearest known populations in Siaya County, but are the first from the south side of Winam Gulf.

Figure 10. One of a small flock of Black-rumped Waxbills *Estrilda troglodytes* foraging in roadside grasses in Ruma National Park, 26 March 2017 (photo: James Bradley).

Acknowledgements

I would like to thank Dominic Chesire, David Guarnieri, Yvonne Muhingi, Simon Carter, Tyler Davis, David Bradley and Nathan Hentze for sharing these birding observations with me in the field. Simon Carter and Nathan Hentze also kindly permitted me the use of their photographs. I thank Washington Wachira for sharing observations from the Lambwe River Estuary, and Tyler Davis and Brian Finch their observations from the western Maasai Mara. Don Turner, Brian Finch, Dick Forsman and Itai Shanni kindly assisted in the identification of several species, while Darcy Ogada provided a useful editorial review. Don Turner also kindly assisted with some old unpublished records of Miles Coverdale's, which helped to improve this note. Lastly, I am grateful to administrative staff and forest rangers at the Kenya Forest Service in Magunga, for assisting with logistics and providing escorts while visiting the Gwassi Hills.

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Scopus 38(1): 16–23, January 2018
Received 24 August 2017

Short communications

A note on flight disorientation over smooth water

This note arises from a fortuitous observation of many dead birds on a peninsula in Lake Magadi in 2000 by IP. When it was mentioned to Alan Root (pers. comm.), he recalled that as far back as the 1960s and since, he had seen many dead birds not normally associated with aquatic habitats on nearby Lake Natron's shores, and suggested that they were casualties of low-level flight over smooth, glassy water. He also recalled another supporting observation for this explanation: in 1962 he camped on the edge of a small soda lake in Ngorongoro Crater frequented by Lesser Flamingos *Phoeniconaias minor*. The night had been still and cloudless, with a full moon. Flamingoes sometimes descend from height by zig-zagging down at high speed. Many did so on this occasion, and periodically there was a loud smack as one of them hit the water with considerable force. In the morning their corpses dotted the surface.

In 1967, one of us (IP) had flown as low as he could over very smooth water on Lake Magadi to test another pilot's assertion of how difficult it was in such circumstances to judge height. Without reference to a shoreline, ripples or floating objects, it was indeed difficult to judge height and the closer to the surface the harder it became. This experience strongly supported Alan Root's contention.

Here we posit the following hypothesis. When absolute calm prevails over a body of water its surface becomes a mirror, radically changing its reflective properties. A rippled surface scatters light from which the eye creates a real composite image that is easy to see and to avoid, even from above. As a mirror, there are no irregularities from which a real image can be formed. All that is visible is the virtual image created by the reflection of the day or night sky above. There being no image of the surface, it becomes invisible to any organism that relies on sight for orientation. Birds and insects flying low over a lagoon cannot see it, hit the water and drown. In lakes Magadi and Natron they are quickly pickled in the saturated carbonate solution. They do not decompose and, due to the brine's density, do not sink but float just under the surface (binocular searches of the major lagoon did not reveal anything protruding above the surface), or become embedded in the trona (a mixture of sodium carbonate and sodium hydrogen carbonate) as it precipitates out of evaporating water.

The outline of Lake Magadi, southern-most of Kenya's Rift Valley lakes, is presented in Figure 1. Numerous hot

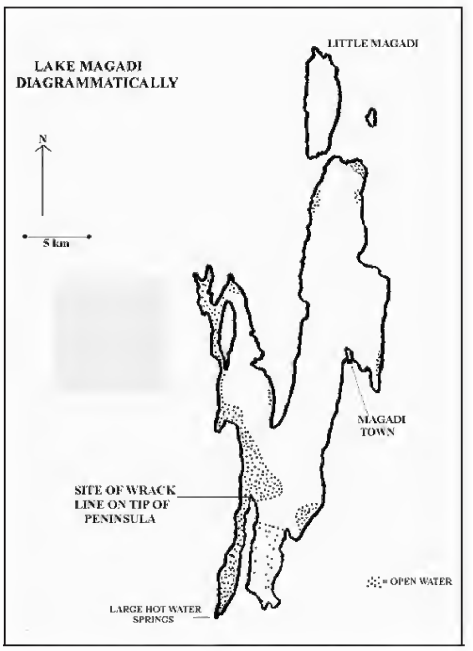

Figure 1. Outline of Lake Magadi.

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(40°– 86°C), intensely alkaline springs and seeps continuously charge it from below and around the shoreline with sodium carbonate brine. Evaporation precipitates trona from the brine as a greyish white or pink deposit. Usually, this trona comprises most of the lake's 100 km² surface. Rarely, after heavy and prolonged rain, open water may briefly cover the trona to a depth of ± 30 cm so that the entire lake surface appears as open water. More normally, open water is a small fraction of the area, as shown in Figure 1.

Where lake edge spring and seep inflows have temperatures <42°C and a pH of *c.* 9, the shoreline and water support a specialized flora and fauna adapted to these extreme conditions, which host many birds that make Magadi a well-known birding hotspot (Bennun & Njoroge 1999).

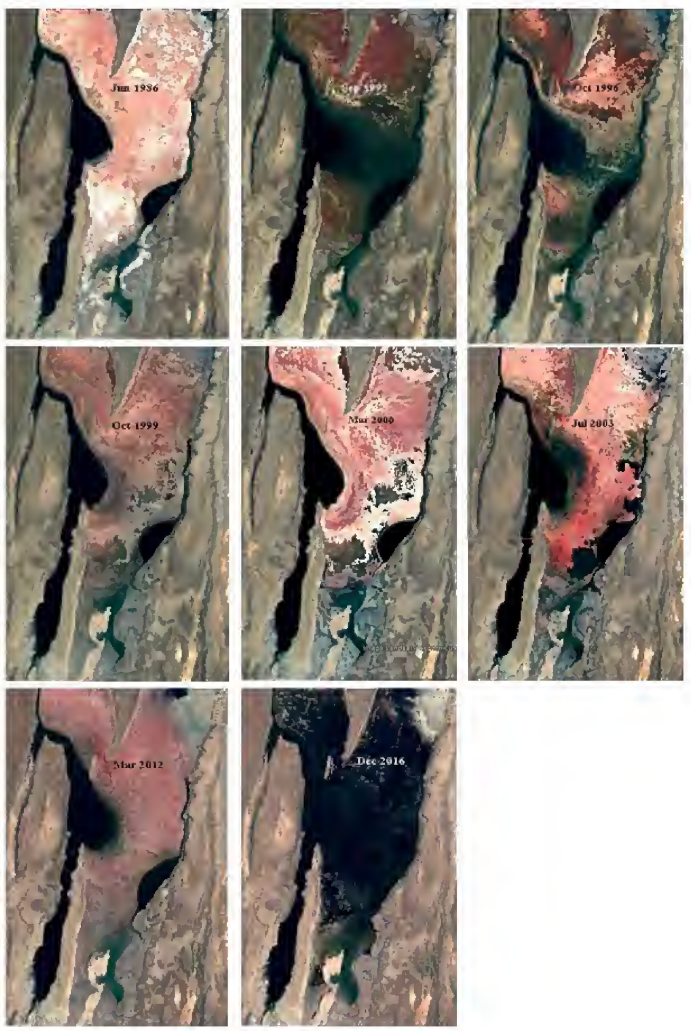

Figure 2. Eight satellite photographs of the southern end of Lake Magadi from Google Earth, spanning the years 1986–2016. These illustrate variations in the expanse of open water, and changes in the shape of the lagoon, the protrusion of the peninsula into this lagoon and how its tip acts as a windward shore upon wind-blown wrack from the east can be trapped. Note that, as in 1986, the tip was sealed off by trona.

Away from the immediate vicinities of such inflows, evaporation concentrates the carbonates, raising the alkalinity beyond the point at which life can exist. In periods of absolute calm these lifeless lagoons form mirrors, the extent of which varies widely over time (Fig. 2). The largest and most persistent of them exists in the southern half of the lake as indicated in Figure 1. Literature on Lake Magadi that may bear on the disorientation hypothesis was summarized from, among others, Bennun & Njoroge (1999), Spawls & Mathews (2012), and Google Earth.

On 20 May 2000 a large deposit of storm wrack between 0.5 and 1 m wide, 0.1 and 0.3 m high and *c.* 200 m long was found on the eastern shore of the tip of a peninsula that projects northward into the largest lagoon (hereafter 'the major lagoon') from the lake's southern end

(Fig. 1). This wrack, composed of dry salted insects and birds, had blown ashore in a storm several days earlier. At the time, only cursory observations were made while IP intended to return quickly to make a more detailed record and analysis. Unfortunately, a return was not possible for several months, by which time it had been dispersed.

The volume of the wrack was estimated at 30 m^3 (0.75 m x 0.02 m x 200 m) and consisted overwhelmingly of insects laced throughout with birds. Arbitrarily assuming an average insect volume of 18 cm^3 (6 cm x 3 cm x 1 cm) and an average bird volume of 150 cm^3 (10 cm x 3 cm x 5 cm), and further assuming there were 100 insects to every bird, the wrack line could have held 1.7 million insects and 17 000 birds.

Recognizable invertebrates were primarily flying insects of the orders Orthoptera (particularly a large brown grasshopper or locust), Coleoptera, Lepidoptera and Hymenoptera. The vertebrates were almost all birds, and those identified are listed in Table 1 at least to family level in three subjective categories: abundant; common; and single. As their remains had been bleached and feathers or body parts were lost, identifications erred on the side of caution and were only made with certainty to family. Some genera and a lesser number of species were recognized. Identifications were made more to illustrate the spectrum of types that had drowned than to establish species. They are supported by photographic examples in Figure 3.

Among the 19 bird families listed in Table 1, only three—Phoenicopteridae, Glareolidae, and Scolopacidae—are waterbirds regularly frequenting Magadi. *Falco amurensis* is a Palaearctic visitor that appears seasonally in the vicinity of the lake. All the others are typical of the semi-arid acacia savanna surrounding Lake Magadi. However, the birds listed are only a fraction of the birds expected in that environment (e.g., Zimmerman *et al.* 1996), and are unlikely to have been exhaustive of those in the wrack line. Missing from Table 1 are waders, which are abundant on Lake Magadi, and birds that can swim (e.g., Cape Teal *Anas capensis*). Perhaps they have evolved mechanisms for avoiding disorientation, or it may simply mean that they can swim, and fly off the water. Interestingly, among the insects, the freshwater belastomatids that rely on emergent vegetation or access to a shore to exit water were among the casualties.

Between September 2000 and December 2010 five further visits were made to the lake. Although the large quantity of dead animals seen on the first occasion was not seen again, the shore on the same windward tip of the peninsula always yielded some dried, salted birds and a greater number of insects. Searches along windward shores of other lagoons elsewhere in Lake Magadi and one helicopter trip to the larger soda Lake Natron, also produced scatterings of salted birds and flying insects.

The prevailing easterly winds produce a gradual drift of drowned animals towards the eastern side of the peninsula or past it to the main lake's west shore. The springs and seeps along the western lake edge lower the alkalinity sufficiently for tissue decomposition and consumption by the fish *Alcolapia grahami*. On the peninsula where there are no springs or seeps, pickled specimens washed ashore remain until rain dissolves the salts and they decompose or are scavenged. Occasionally, a strong overhead storm can drop enough water to exhume birds and insects from the trona to rejoin those that were still floating, which may account for the unusually large number washed ashore in May 2000.

A terrestrial shrew, a rodent, scorpions and a guineafowl egg were presumed to have been washed into the lake during heavy rain. The echo-locating bats are likely to have missed the surface because it reflected their sound pulses away when these

Figure 3. Salted birds recovered from the windward shores of lagoons on Lake Magadi, identified to family or genus.

were emitted at oblique angles (pulses directed down at obtuse angles would produce strong echoes back to their source, but as would be the case in a fast flying bat, pulses directed ahead obliquely would produce no echo as a property of mirrors is that incoming radiation whether light, sound or radio is deflected away at the same angle at which it comes in).

Table 1. Birds recognized among Lake Magadi's pickled casualties. Ascription to family, genus and species was only made where certain. Column 1 = abundant, 2 = many, and 3 = singles.

Family	Genus	Species	Common name	1	2	3
Phoenicopteridae	*Phoeniconaias*	*minor*	Lesser Flamingo		x	
Accipitridae	*Elanus*	*caeruleus*	Black-shouldered Kite			x
Falconidae	*Falco*	*amurensis*	Amur Falcon		x	
Phasianidae	*Coturnix*		quail			x
Phasianidae	*Francolinus*	*sephaena*	Crested Francolin			x
Turnicidae	*Turnix*	*sylvatica*	Common Buttonquail		x	
Glareolidae	*Glareola*		pratincole			x
Scolopacidae	*Calidris*		stint, probably Little			x
Columbidae	*Streptopelia*		dove		x	
Tytonidae	*Tyto*		owl, probably Barn			x
Apodidae			swift		x	
Colidae	*Urocolius*	*macrourus*	Blue-naped Mousebird		x	
Phoeniculidae			wood-hoopoe, green?			x
Capitonidae	*Lybius (?)*		barbet			x
Alaudidae	*Eremopterix*	*leucopareia*	Fischer's Sparrow-lark	x		
Motacillidae	*Anthus*		pipit		x	
Hirundinidae	*Hirundo*		swallow		x	
Sylvidae	*Cisticola*		cisticola		x	
Ploceidae	*Ploceus*		weaver		x	
Ploceidae	*Quelea*	*quelea*	Red-billed Quelea	x		
Viduinae	*Vidua*		whydah			x

The frequency of an event such as that recorded in May 2000 is moot. It might have resulted from an unusual combination of an exceptionally violent wind and heavy rain after a long period of accumulating pickles—both those floating and washed out of recently deposited trona—and unusual only in the sheer volume of the wrack line. The presence of smaller numbers of salted birds and insects on the peninsula in subsequent years and on other windward shores elsewhere indicate the process was ongoing. It is tempting to speculate that the large wrack event was the result of accumulating pickles over the period 1992 to May 2000 when the large lagoon had persisted for eight years. However, the rate at which casualties accumulate is also moot and awaits further elucidation.

The difficulty of sensing smooth water surfaces not only influences flying birds, insects and aviators, but high divers. For example, the Australian Diving Association's Hand Book Section FR 5.3.10 states, "Mechanical surface agitation shall be installed under the diving facilities to aid the divers in their visual perception of the surface of the water," confirming our central point.

If our hypothesis is valid, and disorientation is a general feature of flying low over smooth water, it may be a source of hitherto unsuspected mortality for flying animals generally. It only became apparent in situations such as Magadi and Natron because the casualties were preserved, float and do not decompose as would quickly happen in freshwater. As an aside, it might explain the early European belief that Barn

Swallows *Hirundo rustica* hibernated underwater in mud (White 1813). All it needed was a fisherman once finding drowned swallows in his net as the strand of truth that established a myth arising in disorientation over smooth water.

We hope that this record will stimulate other researchers to investigate more methodically what might be a source of hitherto overlooked avian mortality.

Acknowledgements

Don Turner and Darcy Ogada encouraged us to make this record, Charles Dewhurst gave advice and Christine Parker checked our grammar.

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Scopus 38(1): 24–29, January 2018
Received 18 May 2017

The Southern Black Tit *Melaniparus niger* in Tanzania with comments on the Northern Black Tit *M. leucomelas*, White-shouldered Black Tit *M. guineensis* and the White-bellied Tit *M. albiventris*

We follow Johansson *et al.* (2013) in using *Melaniparus* rather than *Parus* for the genus.

Britton (1980) did not admit the Southern Black Tit to the Tanzania avifauna, commenting only that Hall & Moreau (1970) had extended the range of *Parus niger* north to southeast Tanzania based on the type of *P. fuelleborni* from Songea District which Sclater (1930) had earlier considered to be a young bird.

Parus fuelleborni (Reichenow 1900, *Ornithologische Monatsberichte* 8: 5) was collected by Friedrich Fülleborn at Undis south of Tunduru near the Tanzania – Mozambique border (11°17'S, 37°20'E) in 1898, but was not referred to by either Mackworth-Praed & Grant (1955), White (1963), Peters (1967) nor by most subsequent authors. Meanwhile, Hall & Moreau (1970) mapped a specimen from southern Tanzania but the locality shown was 230 km west of Tunduru.

During visits to southeast Tanzania in February 1996, July 2005, November 2014 and August 2016, birds were seen that were suspected to be this species, but it was not until a visit in September 2016 that photographs were obtained that conclusively show that these birds are indeed *M. niger* (Figs. 1 & 2). The black wing coverts with bold white edges are diagnostic of *M. niger* while the pale grey belly and pale-tipped under-tail coverts of the female are also clearly seen. Having established that *M. niger* was perhaps widespread in southeastern Tanzania we checked all records in the Tanzania Atlas database. We are now of the opinion that the following records all relate to *M. niger* and these are included as such in the species maps (Maps 1 & 2).

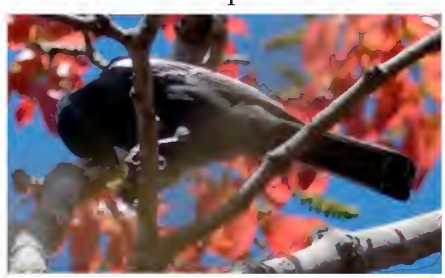

Figure 1. Southern Black Tit *Melaniparus niger* a female from the smoky grey lower belly and pale tips to the under-tail coverts, southeast Tanzania, 3 September 2016.

Figure 2. Southern Black Tit *Melaniparus niger* a second view of the diagnostic wing pattern.

Masasi; September 1939 C.J.P. Ionides (might a specimen exist?)
Nachingwea; October 1966 (R.J. Stjernstedt)
Chitowe; February 1996 (pers. obs.)
Ndechela Forest Reserve; September 2000 (M. Baker)
70 km southeast of Liwale 4 July 2005; (pers. obs.)
Tunduru-Masasi road; May 2009 (D. Peterson)
Mwambesi Game Control Area; 22 November 2014 (pers. obs.)
Ruvuma River 77 km southwest of Tuduru 27 November 2014; (pers. obs.)
Selous Game Reserve southeast boundary; 28 August 2016 L. Mlawila
Selous Game Reserve southeast boundary; 31 August 2016 (pers. obs.)
Mirui to Ruangwa; 3 September 2016 (pers. obs.)
12 km north of Ruangwa; 7 September 2016 (pers. obs.)

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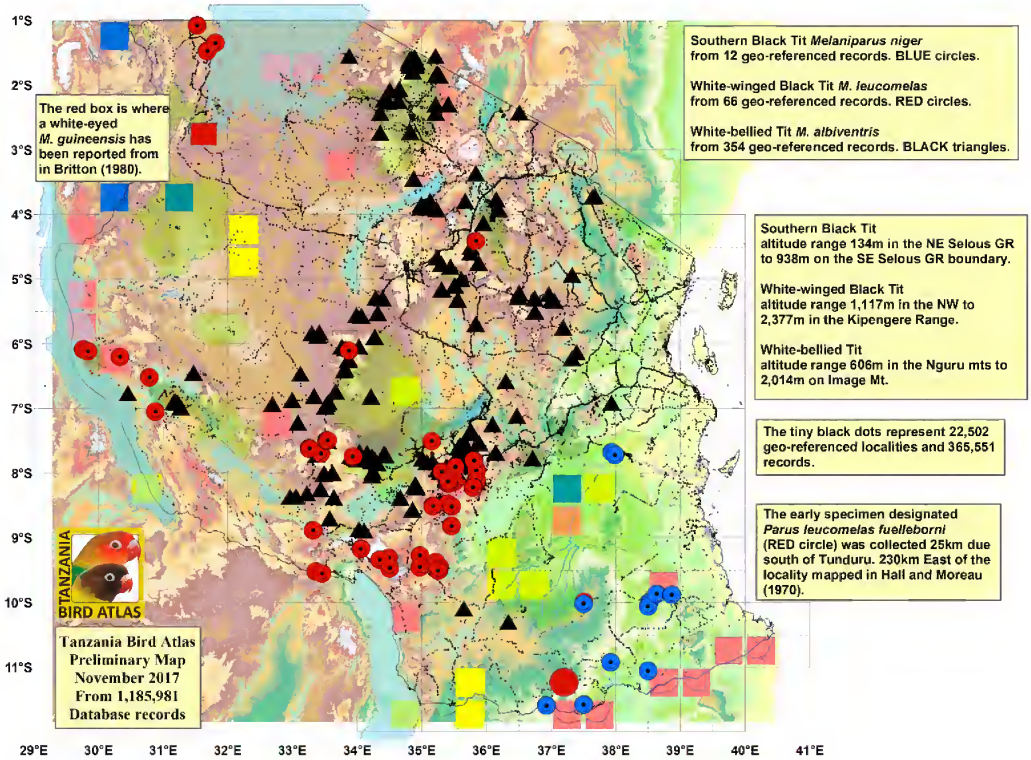
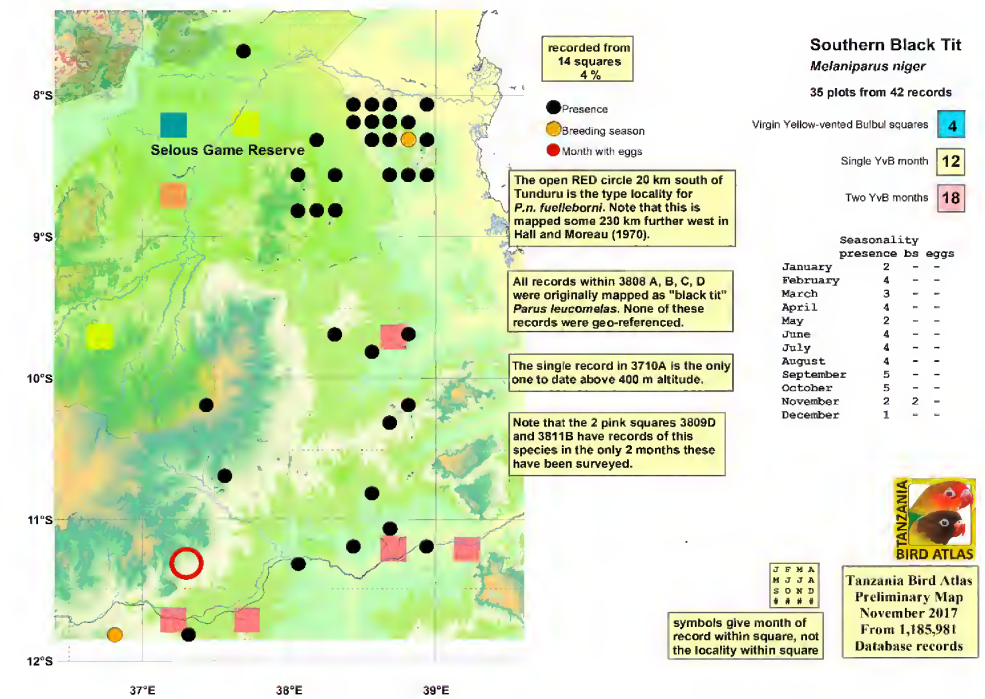

Southern Black Tit *Melaniparus niger* from 12 geo-referenced records. BLUE circles.
White-winged Black Tit *M. leucomelas* from 66 geo-referenced records. RED circles.
White-bellied Tit *M. albiventris* from 354 geo-referenced records. BLACK triangles.
The red box is where a white-eyed *M. guineensis* has been reported from in Britton (1980).
Southern Black Tit altitude range 134m in the NE Selous GR to 938m on the SE Selous GR boundary.
White-winged Black Tit altitude range 1,117m in the NW to 2,377m in the Kipengere Range.
White-bellied Tit altitude range 606m in the Nguru mts to 2,014m on Image Mt.
The tiny black dots represent 22,502 geo-referenced localities and 365,551 records.
The early specimen designated *Parus leucomelas fuelleborni* (RED circle) was collected 25km due south of Tunduru. 230km East of the locality mapped in Hall and Moreau (1970).
TANZANIA BIRD ATLAS
Tanzania Bird Atlas Preliminary Map November 2017 From 1,185,981 Database records
1°S
2°S
3°S
4°S
5°S
6°S
7°S
8°S
9°S
10°S
11°S
29°E
30°E
31°E
32°E
33°E
34°E
35°E
36°E
37°E
38°E
39°E
40°E
41°E

Map 1. The distribution in Tanzania of *M. niger*, *M. leucomelas* and *M. albiventris* from the geo-referenced records in the Atlas database.


Selous Game Reserve
recorded from 14 squares 4 %
Presence
Breeding season
Month with eggs
The open RED circle 20 km south of Tunduru is the type locality for *P.n. fuelleborni*. Note that this is mapped some 230 km further west in Hall and Moreau (1970).
All records within 3808 A, B, C, D were originally mapped as "black tit" *Parus leucomelas*. None of these records were geo-referenced.
The single record in 3710A is the only one to date above 400 m altitude.
Note that the 2 pink squares 3809D and 3811B have records of this species in the only 2 months these have been surveyed.
Southern Black Tit
Melaniparus niger
35 plots from 42 records
Virgin Yellow-vented Bulbul squares 4
Single YvB month 12
Two YvB months 18
Seasonality
presence bs eggs
January 2 - -
February 4 - -
March 3 - -
April 4 - -
May 2 - -
June 4 - -
July 4 - -
August 4 - -
September 5 - -
October 5 - -
November 2 2 -
December 1 - -
J F M A M J J A S O N D
symbols give month of record within square, not the locality within square
TANZANIA BIRD ATLAS
Tanzania Bird Atlas Preliminary Map November 2017 From 1,185,981 Database records
8°S
9°S
10°S
11°S
12°S
37°E
38°E
39°E

Map 2. The distribution of Southern Black Tit *M. niger* suggested in this account.

Further to these 12 records there are 27 observations by Neil Stronach from February 1991 to April 1993 from the Selous Game Reserve. Localities named are Kingupira West, Utungu, Ngarambe, Tundu Hill, Kingupira southwest and Kandwale. These were all originally submitted as *M. leucomelas* because *M. niger* was not known from Tanzania and was not included in any reference books or field guides. None of these records are geo-referenced, simply recorded to Atlas square, roughly a 50 km x 50 km grid (a quarter of a degree square). All are shown on the standard Atlas map (Map 2). All of the 39 records mentioned above are from south of the Rufiji River, a known barrier to bird populations. There are also three observations from just north of the Rufiji River within the Selous Game Reserve. One of these by Neil Stronach from Kimeru / Nbassa in October 1991. The other two by Walter Jubber from the vicinity of Beho Beho Lodge in June 2011. A South African birder, Mr Jubber originally identified these birds as *M. niger* but included them as *M. leucomelas* after reading that the former did not occur in Tanzania.

Of the 11 records admitted here that are geo-referenced, the highest altitude is at 988 m along the southwestern boundary trace of the Selous Game Reserve at 10°01′S, 37°30′E in mature Miombo woodland dominated by *Brachystegia* spp. All other records to date are below 400 m the lowest altitude is at 211 m north of Ruangwa in dry broad-leafed woodland at 9°52′S, 38°52′E. There is one further geo-referenced record from Miombo woodland at 9°52′S, 38°38′E. From what is known to date this bird prefers the dryer woodland rather than the richer Miombo and this would restrict its distribution in south-eastern Tanzania. The breeding season of this population is not known so we cannot state that any birds are resident within the Miombo belt rather than seasonal visitors from adjacent woodlands.

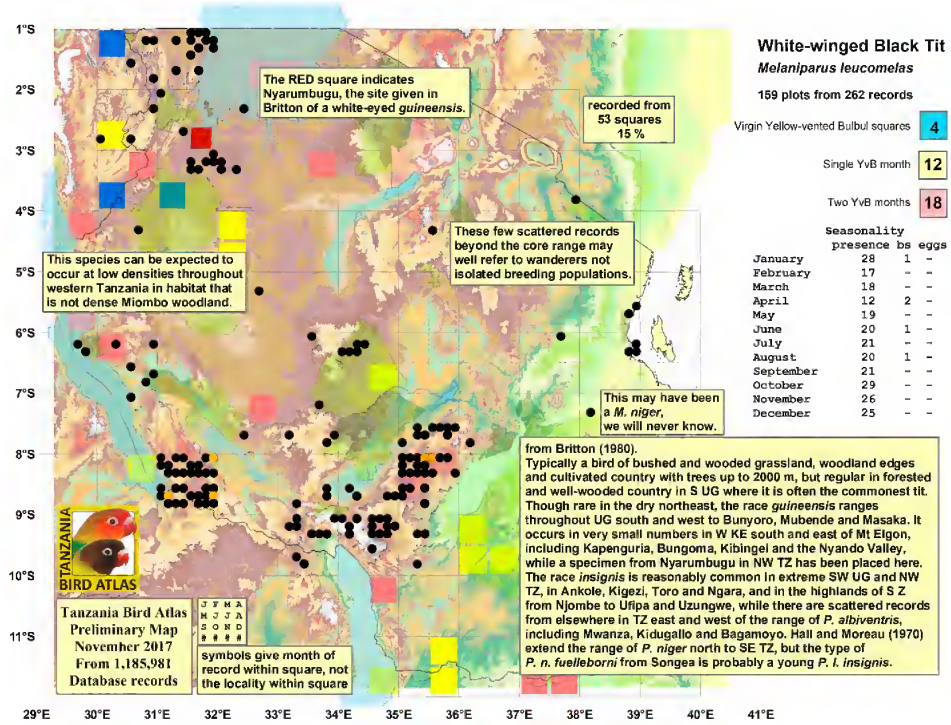
The Atlas database includes six further records from eastern Tanzania that have been assigned to *M. leucomelas* (Map 3). These records from north of Bagamoyo to Pembe-Abwe south of Pangani include a specimen from November 1929 (Bangs & Loveridge 1933). This specimen needs to be re-examined to confirm its identity. If it is indeed *M. leucomelas insignis* as reported then it and the few other extralimital records can be considered as wanderers from the core range.

The Atlas database holds 262 records that we now assign to *M. leucomelas*. These are shown on standard Atlas maps (Map 3). The 65 geo-referenced records are shown on Map 1. Ignoring potential wanderers to north-eastern coastal areas the altitude range of these geo-referenced records is from 1117 m to 2377 m near Mangangarawa at 9°20′S, 34°20′E.

There is a clear ecological and altitude gap between known populations of *M. leucomelas* and *M. niger*. The closest known localities are 252 km (straight line) apart with an altitude difference of 570 m.

M. leucomelas is nowhere common but there are now 24 records north of 3°S in northwestern Tanzania (*cf.* Britton 1980), but rarely has eye colour been described. Britton (1980) allows a specimen of the race *M. l. guineensis* from Nyarumbugu given as 2°46′S, 31°20′E in the gazetteer. The most recent record from Minziro Forest Reserve in July 2016 (pers. obs.) was clearly a dark-eyed *leucomelas* rather than a pale-eyed *guineensis*. It has been established in south-western Uganda that pale-eyed and dark-eyed birds overlap in range (Turner & Pearson 2015). This overlap would appear to extend well into north-western Tanzania, but more careful observations are required to confirm the limits of both taxa. Nyarumbugu is shown by a red square on Map 3.

The fourth species of black and white tits in Tanzania is the White-bellied Tit *M. albiventris*. The 340 geo-referenced records for this widespread species are shown as black triangles on Map 1. Note this is the most widespread of the four species with minimum overlap in range with *M. leucomelas* and no overlap with *M. guineensis* or with *M. niger*.


White-winged Black Tit
Melaniparus leucomelas
159 plots from 262 records
Virgin Yellow-vented Bulbul squares 4
Single YvB month 12
Two YvB months 18
Seasonality
presence bs eggs
January 28 1 -
February 17 - -
March 18 - -
April 12 2 -
May 19 - -
June 20 1 -
July 21 - -
August 20 1 -
September 21 - -
October 29 - -
November 26 - -
December 25 - -
The RED square indicates Nyarumbugu, the site given in Britton of a white-eyed guineensis.
recorded from 53 squares 15 %
These few scattered records beyond the core range may well refer to wanderers not isolated breeding populations.
This species can be expected to occur at low densities throughout western Tanzania in habitat that is not dense Miombo woodland.
This may have been a M. niger, we will never know.
from Britton (1980).
Typically a bird of bushed and wooded grassland, woodland edges and cultivated country with trees up to 2000 m, but regular in forested and well-wooded country in S UG where it is often the commonest tit. Though rare in the dry northeast, the race guineensis ranges throughout UG south and west to Bunyoro, Mubende and Masaka. It occurs in very small numbers in W KE south and east of Mt Elgon, including Kapenguria, Bungoma, Kibingei and the Nyando Valley, while a specimen from Nyarumbugu in NW TZ has been placed here. The race insignis is reasonably common in extreme SW UG and NW TZ, in Ankole, Kigezi, Toro and Ngara, and in the highlands of S Z from Njombe to Ufipa and Uzungwe, while there are scattered records from elsewhere in TZ east and west of the range of P. albiventris, including Mwanza, Kidugallo and Bagamoyo. Hall and Moreau (1970) extend the range of P. niger north to SE TZ, but the type of P. n. fuelleborni from Songea is probably a young P. l. insignis.
TANZANIA BIRD ATLAS
Tanzania Bird Atlas Preliminary Map November 2017 From 1,185,981 Database records
J F M A M J J A S O N D
symbols give month of record within square, not the locality within square
1°S
2°S
3°S
4°S
5°S
6°S
7°S
8°S
9°S
10°S
11°S
29°E
30°E
31°E
32°E
33°E
34°E
35°E
36°E
37°E
38°E
39°E
40°E
41°E

Map 3. The distribution of White-winged Black Tit *M. leucomelas* in Tanzania.

Acknowledgements
Marc Baker, Walter Jubber, Leons Mlawila, David Peterson, Neil Stronach and the late Bob Stjernstedt are thanked for submitting records to the Atlas.

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Scopus 38(1): 30–33, January 2018
Received 15 February 2017

Notes on breeding, plumage, locomotion and feeding in Little Grebes *Tachybaptus ruficollis*

Introduction

These notes on Little Grebes *Tachybaptus ruficollis* fall into two sections: the first a complete breeding record cycle, the second on observations of a hand-reared immature. Brown *et al.* (1982) stated "broods of two to three in East Africa [are] usually reduced to one or less by end of fledging period." Here, where five hatchlings were reduced to zero, such decline is documented. A fledged immature, once returned to its natal dam and able to fend for itself and despite habituation and artificial feeding, permitted proximity to within touching distance which allowed observations to be made on locomotion and feeding that would otherwise have been difficult.

Observations on breeding cycle

On 24 May 1998 a Little Grebe in immature plumage appeared on a small, roughly oval dam (1°23'S, 36°44'E, *c.* 1720 m) with a maximum diameter of 50 m in Nairobi's Langata suburb. Peripheral vegetation included patches of *Papyrus* sp., *Phragmites* sp., *Typha* sp. and *Nymphae* sp. On 26 May a second grebe in adult plumage arrived and within 24 h the courtship trill as described in Brown *ibid.* was being uttered frequently by both birds who spent all observed time within 10 m of one another.

On 31 May a second grebe in adult plumage appeared. The two adults were close to one another when first observed, both uttered the courtship trill several times an hour. Periodically they chased the bird in immature plumage, which spent more time skulking under overhanging *Phragmites* reeds than on open water. It disappeared on 3 June after three days of being harried by the adult birds.

By the same date, 3 June, the two adults were already building a floating nest of aquatic weeds within a bed of *Phragmites* and anchored to a stem of this plant, in water *c.* 70 cm deep. By 10 June it contained five eggs which were routinely covered whenever an incubating bird left the nest as described by Broekhuysen (1973). Commencement of incubation was not recorded, but was apparent by 6 June, i.e. before the last egg was likely to have been laid. Material was added to the nest which grew throughout incubation as reported in Brown *et al.* (1982). When the fifth egg was laid, the bottom of the internal nest cup was only *c.* 5 mm above water level. Before the first egg hatched this had increased to *c.* 4 cm. No other nest or courtship platform as reported by Brown *et al.* (1982) was made.

The date the first egg hatched is not known, but all had hatched by 5 July, i.e. within 32 days after nest building began. Once hatched, the young stayed on or at the nest accompanied by an adult for the next 11 days until 16 July. An adult was either with them on the nest or not more than 1 m from it throughout this period.

Among grebes in general, young are reported riding on adults' backs, e.g. Brown *et al.* (1982), del Hoyo *et al.* (1992)—Little Grebes among them. The term 'riding' tends to obscure the reality that, at least in *T. ruficollis*, 'brooding' is more appropriate. The young were brooded, not underneath an adult, but between folded wings and on the back covered by scapulars, tertials and central back feathers. Sometimes they were completely hidden beneath these feathers, at other times, heads protruded. At yet other times they sat openly, thus more 'riding' on an adult's back.

On 17 July the five chicks were following an adult on open water. Numbered one to five in order of descending size, the difference between them was obvious, re-

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flecting asynchronous hatching, presumably because incubation began before the last egg(s) was laid (del Hoyo *et al.* 1992). Over the next week this gradation became more obvious with the smallest chick subjectively half the size of the largest. Periodically, but with declining frequency, the young returned to and climbed on to the nest with an adult. The two smallest chicks, no. 4 and no. 5, spent more time on the nest and occasionally stayed there when the others followed a foraging adult.

After this same week during which both parents fed the young, on 25 July one adult ceased to do so. For a day it stayed still almost hidden among *Papyrus* stems, seemingly ill, and then disappeared. From then on the remaining adult spent all observed time hunting and feeding the young which followed it closely, soliciting with cheeping calls. On 28 July, three days after the first adult vanished, chick no. 1 was repeatedly attacking other young. By 2 August it had effectively established a mobile 'territory' about its parent, not allowing any other young within 2 m or so of it, effectively monopolizing all food provided by the adult. After a further two days, the adult itself was enforcing the 'territory' around itself and attacked any of the young which approached it except chick no. 1.

While chick no. 1 spent all its time protecting the adult from its siblings and being fed, the others started foraging for themselves, making short dives (3–5 s) mostly along the dam edges in thin aquatic vegetation. By now the size range between them was even more accentuated. Size was not the only difference between the siblings. Plumage colouring was most advanced with the largest, and least developed on the smallest, with nestling neck stripes being still prominent. Plumage change in the young Little Grebe is thus not related to time alone, but presumably to nutritional condition as well.

On the 5 August chick no. 5 was recovered comatose from the nest. Warmed and force-fed, it recovered. A day later, it could catch small guppies *Poecilia reticulata* and *Haplochromis* sp. fry in a kitchen sink half filled with water. On 6 August chick no. 4 was picked up alive on dry land 100 m from the dam. On 7 August chicks no. 2 and no. 3 were found on another pond some 25 m from the natal dam which, in order to reach, they had moved either through a patch of *Euclea* woodland or through thick *Panicum repens* grass. When found, both were foraging vigorously, diving for periods of more than 5 s. Neither lasted 4 h, however. In shallow water in thick grass, one was killed by a dog and shortly afterwards the other was taken by a Great Sparrowhawk *Accipiter melanoleuca*.

On 8 August chick no. 1 disappeared, and on 9 August the single adult had gone. While the loss of a parent may have 'overloaded' the surviving parent, the disintegration of this clutch of five grebe nestlings is in keeping with Brown's *op. cit.* record of hatchlings' poor survival. This observation presents a case of this process, and that under duress, despite grebe's inability to walk easily on land and presumably through harassment by both a parent and the eldest sibling, three of the five chicks hatched had made substantial terrestrial expeditions away from their natal water.

Observations on plumage change and skin colour in juveniles

The two captives were held in a kitchen sink and fed *ad lib.* with meal worms *Tenebrio* larvae and guppies. Chick no. 5 only survived for seven days. Yet in that time when cold or resting after being fed, it tried to clamber on top of its sibling, rather than trying to burrow beneath it as expected of most young birds seeking to be brooded.

When taken into captivity at a month or slightly more after hatching, all that re-

mained of the hatchlings' russet red on crown, occiput, nape and top of neck for both birds was on the crown. This became more obvious when the birds were being fed and hungry. Specifically, feathers on either side of the crown parted to display an area of very short crown feathers through which the skin beneath could be seen and flushed deep crimson. Thus, though not bald as in the bigger *Podiceps* grebes (Brown *et al.* 1982), this short 'fuzz' does not conceal the skin colouring. At the same time as the crown skin flushed crimson, the bill also changed colour: approaching crimson at the base, but fading towards the tip. Yet under the stress of being caught and held, all trace of red or pink on both crown and bill vanished and the bill became a pale horn yellow.

Observations on locomotion

On 15 August chick no. 4 was transferred to a fish tank 4 m in diameter and *c.* 0.7 m average depth in which there were *c.* 250 tilapia *Oreochromis andersoni* fry and fingerlings. There it could be watched feeding itself in the clear water. It showed two different modes of propulsion. On the surface, the tarsi hung down vertically beneath the bird as do a duck's, and are moved in alternate swimming strokes as in walking or paddling. Submerged, this changed. The legs were rotated outward through 90° so that the tarsi stuck out sideways and horizontally from the body and were moved synchronously like a pair of oars; both are pulled forward with lobes feathered and stroked backwards simultaneously with lobes extended. The efficiency of these oar strokes is greatly enhanced by the medially flattened tarsi minimizing drag. The switch from surface to subsurface leg positions appears to be a reflex triggered by the head entering water. Even when the stationary bird puts its head into the water to look below the surface, when the water reaches the bird's ear orifices, the tarsi flick outward into subsurface 'oaring' mode. As the head is withdrawn the tarsi drop down into surface 'paddling' mode.

The hydrodynamic advantages of the two propulsion systems are self-evident. On the surface, where a grebe has wings to acquire aerial speed, simple paddling leg movements are adequate. Below the surface where it needs speed for pursuing prey, synchronous oaring is more efficient. Using a pair of oars alternately would, in addition to providing forward motion, expend energy wastefully in lateral thrust away from the stroking oar and induce a zigzag course, as anyone who has rowed a boat will appreciate. Stroking synchronously, the oars cancel their opposing lateral thrusts.

Underwater when hunting, the grebe's plumage appears compressed and the wings kept tightly folded, changing the bird's rotund surface appearance into an altogether sleeker and slimmer outline. Relative to the bird's surface outline, the legs extended sideways appear longer. Pursuing fish underwater, the grebe was agile and fast, easily outpacing and out manoeuvring tilapia up to 5 cm long.

On 25 August, > 50 days after hatching, grebe no. 4 was returned to its natal dam, now in its full immature plumage as described in Brown *et al.* (1982). However, up to this point it had not been seen trying to fly. It remained on the dam until December 1998 before disappearing. In the four months that it was present, its habituation to humans was reinforced by regular offerings of meal worms. It would approach people who came to the dam and usually stay in close proximity to them, even when not being fed.

Approaches to visitors by the reintroduced chick were sometimes made by paddle-swimming gently on the surface. At other times it approached using the typical Little Grebe skittering flight over the water surface. Yet, if hungry, it dived and 'oared'

its way to them just below the surface where its progress was visible. Subjectively, this subsurface oaring was far faster than its aerial skittering flight.

When at rest, the grebe raised its tarsi above water level, tucking them beneath the long, dense flank feathers that normally cover the folded wing. Consequently, all unfeathered parts of the bird were insulated from contact with water which presumably enhanced heat retention.

With tarsi drawn up out of the water, the bird's rounded underside presents little resistance to wind pressure. The slightest breeze moved the grebe, often rotating gently across the water surface. To resist such drifting, it often rested against, or sometimes on, lily leaves *Nymphae* or other aquatic vegetation.

Observations on feeding

The grebe disabled small prey with a mandible pinch before consuming it. When presented with a simultaneous choice of aquatic life from a scoop net, small insects, dragonfly larvae, small fishes and small crustaceans *Procambarus clarkii* of <3 cm in length were all taken. Despite having taken guppies when in the kitchen sink, they and tilapia fry were selected less readily than small insects and crustaceans when the bird could select. To measure ingestion underwater, 20 meal worms were dropped into water and sank to a depth of *c.* 0.4 m where they could be seen and the grebe had to dive to get them. The most it collected and swallowed underwater without surfacing was seven meal worms, seized while sinking or off the bottom.

No prey > *c.* 2 cm long was seen ingested under water. However fishes of *c.* 5 cm and *Rana* tadpoles >8 cm were very occasionally caught, brought to the surface, held in the bill by either their head or tail, and killed by repeated head flicks. The whiplash violence of this movement was sufficient to break up a soft-bodied tadpole. To test how large an item the grebe could swallow, it was fed strips of raw fish, the biggest, which it ingested with some difficulty, being 12 cm x 1 cm x 1 cm. For the most part, however, it took much smaller prey.

Acknowledgements

I am indebted to my referee Colin Jackson for comments and an improved text and my wife Christine who observed and recorded these observations with me.

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Scopus 38(1): 34–37, January 2018
Received 23 July 2017

Disarray in avian taxonomy and nomenclature: dilemmas facing authors, checklist compilers and museum curators

At present, more than 1400 species have been recorded in East Africa (Kenya, Tanzania and Uganda) with well over 1000 from each of them.

Britton (1980) listed 1293 species for East Africa, and since that milestone document, our knowledge of the East African avifauna has come a long way, starting with the DNA-DNA hybridization work of Sibley *et al.* (1988) that advocated some significant changes to our earlier understanding of avian taxonomy. A few years later saw the publication of several world checklists by Howard & Moore, Clements, HBW/Birdlife International and the International Ornithological Committee (IOC), and, depending on who one chooses to follow, the East African, Kenya, Tanzania and Uganda bird lists can vary considerably. Authors, compilers of checklists, local bird report editors, and others, not to mention museum curators of birds, are all affected enormously: in which order should they arrange birds and which names to use for them.

So where does this leave those of us who have for so long been accustomed to certain traditional and often conservative beliefs—for the order and also for the names—when compiling country checklists? In East Africa, the starting point was certainly Britton (1980) whose order of families followed that of Wetmore (1960), while genera were arranged alphabetically within subfamilies, and species alphabetically within genera. Nomenclature largely followed White (1960, 1961, 1962a, 1962b, 1963, 1965) for the Afrotropical species and Vaurie (1959, 1965) for Palaearctic migrants. Later in Kenya, the East Africa Natural History Society bird checklists of 1996 and 2009 adopted a number of then recently suggested changes in the volumes of *The Birds of Africa* and in Dickinson (2003), but at the same time maintained a cautious approach to new species-splits and the arrangement of genera. More recently, in Zimmerman *et al.* (1996), the sequence of families followed was largely that of Voous (1977, 1985), while the taxonomic treatment largely paralleled that of the published volumes of *The Birds of Africa* series (Brown *et al.* 1982, *et seq.*).

In the meantime, and particularly during the last decade (2007–2017), we have witnessed nothing short of a revolution in avian classification, taxonomy and nomenclature, coupled with a 'tidal wave' of taxonomic recommendations. Depending on who one decides to follow, be it the 'Howard & Moore' 4th edition by Dickinson & Remsen (2013) and Dickinson & Christidis (2014), 'HBW/Birdlife International' by del Hoyo & Collar (2014, 2016), the International Ornithological Committee by Gill & Donsker (2017), or 'Clements' by Cornell University Press (2016), we find world checklists at variance with one another in terms of families, genera, species and subspecies adopted, simply because each 'authority/author' uses different criteria for what constitutes a species, how it is classified and what names it is given, both scientific and English. Currently Howard & Moore Vol 4 recognize some 10135 species worldwide, Clements 10514, the IOC around 10650 and HBW/Birdlife International almost 11000 species. The only semblance of common ground being the order and sequence of avian families, that started with the ground-breaking unfolding of the great Tree of Life by Hackett *et al.* (2008), later so succinctly expanded upon by Cracraft (2013, 2014), Jarvis *et al.* (2014) and Prum *et al.* (2015) and which has now largely been accepted worldwide, including by our own East African Taxonomic Committee.

Meanwhile, as Garnett & Christidis (2017) have pointed out, rules for taxonomy

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have many consequences, one major issue being the use of either the Phylogenetic Species Concept (PSC) or the Biological Species Concept (BSC) when determining what constitutes a species. While most taxonomists dealing with mammals use the PSC, the majority of avian taxonomists favour the more conservative BSC. However, taxonomists in general are not accountable to anyone other than their academic peers, and as a result species are created or dismissed arbitrarily according to the individual taxonomists' adherence to one of many definitions. As a result, there is no global oversight of any taxonomic recommendations, leaving researchers, checklist compilers, authors of bird books and the bird-watching community at large free to split or lump species at will.

An important aspect of this rather chaotic situation is that many taxonomic recommendations impact on regional conservation programmes, but sometimes in a 'good' way. Depending on which 'Species Concept' is used, one species or subspecies can seem to be more threatened than another, and so receive a larger slice of conservation funding. Similarly, the splitting or lumping of species protected by national laws can influence investment and ultimately national land-use policies (Garnett & Christidis 2017).

So how can we here in East Africa review and later revise our regional and national bird checklists in a way to bring as broad an agreement as possible among our three national checklist committees and compilers? In my revision (Turner & Turner *in prep*) of Britton (1980), all alternate names, scientific and English, currently in use by the three major players (H&M 4, HBW/Birdlife International and the IOC) are listed; also, any variance in the taxonomy and classification adopted in those published world checklists is noted. At the same time, however, we must always keep reminding ourselves that species cannot be defined solely on phylogenetic evidence alone: and while it is sensible to note such results, there is a need for a caveat that although such results may *suggest* certain relationships, they may not necessarily *prove* them.

The East African Taxonomic Committee, under the guidance of Nigel Hunter, is well into its deliberations. When complete, it is hoped that there will be some broad agreement with a classification, taxonomy and nomenclature recommended for all species and subspecies occurring in the East African region.

Finally, it is hoped that in time, a single, internationally respected scientific body will be given the task of overseeing all avian taxonomic recommendations so that most of the current turmoil may be resolved. Arguments for the publication of a single World Checklist at five, ten or twenty year intervals have already been aired. Certainly, some stability is urgently needed in order to stabilize the current taxonomic 'free for all' existing today.

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Scopus 38(1): 38–41, January 2018
Received 27 August 2017

Honeyguides and beeswax: preferences and support for olfaction in locating it

This note pertains to the knowledge that honeyguides Mellitophagidae come to beeswax (e.g., Fry *et al.* 1988 among many). Between 13 March and 19 November 1993 honeycomb was made available to them to establish their preferences for it in different forms or for its contents as:

I. Dark, dirty, honeycomb without bee larvae, pollen, or honey, but usually lined by remnant pupal casings
II. New pale (white and yellow), clean, honeycomb, without contents
III. Comb rendered by melting to solid clean yellow and pale wax
IV. Honeycomb containing both capped and uncapped bee larvae
V. Honeycomb containing stored pollen (bee bread)
VI. Honeycomb with honey in cells both capped and uncapped

Presentation was on a cut branch (the perch), 1.5 m long and 0.15 m diameter, nailed to the top of a fence post in a wooded garden, Langata, Nairobi, Kenya. The perch was 2 m from a *Terminalia* tree whose morning shadow lay across it, as did the afternoon shadow of a large *Croton megalocarpus*. Thus, while in the open, cover was close by.

Three bays (of length 10 cm x width 5 cm and depth 3 cm, spaced 10 cm apart) were cut into the perch's upper surface to hold the wax samples (Fig. 1). Each depression contained two samples randomly paired to avoid creating association between categories (e.g. dirty wax always appearing with clean wax or larvae appearing with empty comb, etc.) or associating specific cells with any category. The components of pairs and the bays they went into were chosen randomly at least weekly, but often at lesser intervals if bays were emptied or had had to be cleaned.

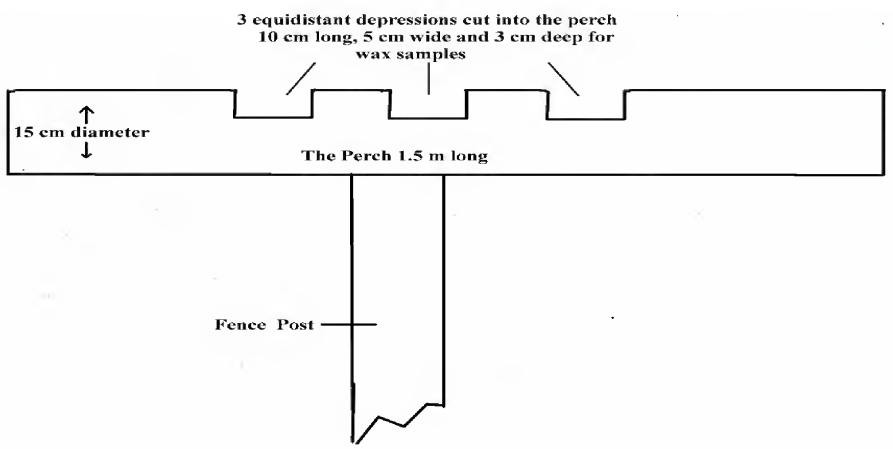
3 equidistant depressions cut into the perch
10 cm long, 5 cm wide and 3 cm deep for
wax samples
15 cm diameter
The Perch 1.5 m long
Fence Post

Figure 1. The perch diagrammatically and not to scale.

Three species of honeyguide came to the perch—Scaly-throated *Indicator variegatus*, Lesser *I. minor* and Pallid *I. meliphilus* – all three tended to approach it from inside the *Terminalia*. No bird was colour-banded or individually identifiable with certainty,

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but on occasions up to three Scaly-throateds and seven Lessers were in the vicinity of the perch at the same time, with all contributing to the results in Table 1.

Table 1. Observations of Scaly-throated, Lesser and Pallid Honeyguides at an experimental feeding station in Nairobi.

	I. variegatus		*I. minor*		*I. meliphus*	
Bait	no. of observations	% of total	no. of observations	% of total	no. of observations	% of total
Old dark comb	4	11.1	1	5.3	0	0
New pale comb	22	61.1	13	68.4	3	37.5
Rendered wax	6	16.7	5	23.3	3	37.5
Bee larvae	2	5.6	0	0	2	25.0
Pollen	2	5.6	0	0	0	0
Honey	0	0	0	0	0	0
Total	36	100.1	19	100.0	8	100.0

From these records, *I. variegatus and I. minor* preferred new comb, followed by comb rendered to solid wax. *I. meliphilus* data are too few for such certainty, but that new comb and rendered wax formed the highest proportion of what they were seen eating hints that, as with the other two, these may be its preferences. Having seen the perch being used, the late Peter Davey wanting a photographic bait, poured molten wax into rough bark on a tree near Athi River where it hardened. Here it was quickly found by *I. minor* and *I. meliphilus* (see photographs from this site on pp. 281 and 283 in del Hoyo *et al.* 2002).

Scaly-throated and Lesser Honeyguides ate some old comb, and might have ingested some old pupal casing. A few bee larvae were taken by both Scaly-throated and Pallid, while an equally small amount of pollen was eaten by Scaly-throateds. All three species seemed to avoid honey and when, as happened, it was in or on new wax and they got it on their bills, they immediately wiped them on the perch and did not go back to the source. None tried to take sealed or unsealed honey from a honeycomb cell, and none tried to take honey by itself when available fortuitously in the bottom of a perch bay.

The few bee larvae taken contradicts both Diamond's pers. comm. report in Fry *et al.* (1988) that captive *I. indicator* sought larvae before eating wax, and Chapin's 1924 observations. Both were reporting on *I. indicator* which may feed differently from the three species reported here. Yet with Diamond the difference might have arisen from his bird being captive and denied the quotient of insects that honeyguides eat in addition to bee products (Hoyo *et al.* 2002). Those noted here were wild with access to the genus's wide range of diets. Chapin *ibid.* only presented a bird with old comb containing larvae limiting its choice to taking what was offered.

Honeyguide disinclination to take honey seems an evolutionary paradox. Honeyguide wax-eating may have evolved from taking scale insects (Coccoidea) which do not produce honey. Yet once they extended their diets to bees (e.g. *Apis, Hypotrigona* and *Trigona*) whose wax was available alongside honey, their avoidance of a food so easily assimilated and nutritious infers an evolutionary pressure not to do so. Such ground may be to avoid honey's stickiness being transferred to plumage and compromising feather function and care.

The three honeyguide species reported here recognized beeswax both as natural honeycomb (in its unique matrix of thin, hexagonal, wax-walled cells), and in its vis-

ually different rendered appearance when melted into a hard opaque mass, ranging in size from a few grams to blocks of several kilograms. That *I. indicator* also has this ability was noted by the Portuguese cleric Jerome Lobo in 1625 (in Chapin *ibid.*) when they ate wax candles.

Further, while comb containing honey, larvae, or pollen quickly attracts bees, thus alerting honey-guides to its presence, bees show little interest in clean, solid, purified beeswax. Yet the birds find it for themselves, and not only recognize it, but seemingly prefer it to old dark comb. This infers that they use cues other than visual recognition to locate it.

On 10 August 1993, an *I. variegatus* was seemingly feeding on a concrete slab. The site was examined closely and the bird had been picking at a very thin film of wax (3 cm^2 area < 0.2 mm thick). Months earlier at this site, boiling water had been poured over a hive frame to melt off old wax. The tiny, very thin, almost translucent film, located cryptically on dirty concrete, discoloured by three months of dust and dirt was all but impossible to see, by a human. Further, it was where beeswax would not normally be found and within 20 m of the very accessible baits on the perch described above.

Further honeyguide ability to locate wax in whatever form was observed during visits by both *I. indicator* and *I. minor* foraging in a dark shed among stored hives and old frames. All had traces of wax on them, but no honey that would have attracted bees. It confirms previous evidence that greater honeyguide also locate wax without the visual appearance of honeycomb or bees to direct them.

An aspect of bee-keeping on the Langata property where these notes were made, was boiling old honeycombs to melt and separate wax from pupal and other debris. The process smelled strongly and attracted bees in such numbers that their presence was a nuisance. To avoid them, boiling was done in a closed room, from which the smell escaped through several bee-proof vents under the eves. The attracted bees flew in clouds about the immediate vicinity, but several lesser honeyguides also attended. While both bees and birds were responding to the same stimulus, the bees milled about in the general area, but the birds fluttered specifically around the vents.

Summed, this inconclusive evidence adds to previous suggestions that honeyguides locate wax through a sense other than sight or by simply following bees; olfaction is the most obvious possibility (e.g. Stager 1967).

Acknowledgements

I thank Luc Lens and Darcy Ogada for useful review and editing comments, and Chris Parker for proof reading.

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Scopus 38(1): 42–44, January 2018
Received 26 August 2017

David Pearson (1941–2017)

With the untimely death from cancer of David Pearson at the early age of 76 on 20 September 2017, ornithology, particularly East African ornithology, has lost one of its greatest sons. He will best be remembered for his interest in bird migration and his enormous efforts towards our understanding of it. He continued the long tradition of British amateur ornithologists and always maintained the highest scientific standards. Many will remember David for his great generosity: he was always very willing to share his knowledge and encourage others, especially the young.

His interest in birds began as a nine-year-old boy in Sibton, Suffolk, eastern England where it was nurtured by his father, Fred, who took him to the nearby marshes and coastal areas around Walberswick, Dunwich and Minsmere. At the age of 15 he joined the Dingle Bird Club and gained his British Trust for Ornithology's 'A' Ringer's Permit in 1957. He remained a member and strong supporter of this ringing and migration group for the rest of his life. He was also an outstanding field observer. Mike Smart, a friend from teenage days, recalls an occasion in late April 1961 when David identified a Western Bonelli's Warbler *Phylloscopus bonelli* near Walberswick by its song. At the time it was only the seventh British record of the species and the first time it had been recorded singing in Britain. He was positive of his i.d. although he'd heard only one before, in France. They went on to catch and ring it, confirming his voice identification (*British Birds* 55: 277).

David John Pearson was born on 26 January 1941, in Bedford. The family moved to Suffolk in 1947, and that county remained his UK base for the rest of his life. After Leiston Grammar School, where he became Head Boy, he went to Cambridge University and obtained a B.A. in Natural Sciences at Gonville and Caius, followed, in 1965, by a PhD in biochemistry; his thesis was entitled 'Carnitine compounds in animal tissues'. In 1964 he married Margaret (Maggie) Barbour and soon after, the young couple set out for Africa for David to take up a lectureship in biochemistry at Makerere University College, Kampala, Uganda in 1965.

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In Uganda during the northern winter, he devoted most of his spare time to ringing in an area of bush at Gaba by the shore of Lake Victoria near Kampala, concentrating on Palaearctic passerine migrants. This work resulted in papers in *Ibis*, *Bulletin of the British Ornithologists' Club*, and *Bird Study*. He also made bumpy 500-km car journeys down to Lake Nakuru in Kenya to ring waders, and that is where we first met, in 1967.

David and Maggie returned to Britain in 1968, where they remained for two years, and David worked as a supply maths teacher in Ipswich, but late in 1970 he secured a lectureship in biochemistry at the University of Nairobi where he stayed until 1990. David was a devoted teacher and his final two years at the university were spent unsupported by the British government, but he insisted on remaining to see his students successfully on their way in medicine. He also published several non-medical biochemical papers during his time there.

In his twenty years based on the Nairobi Chiromo campus, he travelled widely in Kenya, immersing himself in the Kenya Bird Atlas project by usually camping overnight, often with Adrian Lewis (the Atlas co-ordinator), in previously unvisited quarter-degree squares. He also chaired the resurrected Ornithological Sub-committee of the East Africa Natural History Society throughout his time in Kenya. These were fruitful years, which saw the production of *Birds of East Africa* (Britton, P.L. (ed.) 1980, Nairobi: EANHS) a team effort by sub-committee members under the general direction of Peter Britton; the launch of *Scopus* in 1977 that included for many years the comprehensive East African Bird Report, which always began with a review of the year, written for many years by David. The sub-committee worked tirelessly, with monthly meetings held in various Nairobi hotels, often lasting until 23:00 when difficult taxonomic or rare bird issues were discussed in great depth. The sub-committee (later renamed Bird Committee) produced three small, but definitive checklists covering the traditional three East African countries, the Kenyan one running to four editions. David was also heavily involved in the East African Rarities Committee, an international group formed in 1984 to adjudicate records from Kenya, Uganda, Tanzania and surrounding countries, and to maintain the checklists for those countries. He was the vice-chairman of the 6th Pan-African Ornithological Congress held in Francistown, Botswana, in 1985, and scientific programme organizer for the 7th, held in Nairobi in 1988.

Although David was a committed writer and museum researcher, spending many hours poring over skins in the National Museum in Nairobi and the British Museum at Tring, he was an equally keen field worker, never happier than when he was ringing or watching birds. He spent a great deal of his spare time ringing Yellow Wagtails *Motacilla flava* at Nairobi sewage farms and roosts in surrounding suburbs. He also ringed waders at several Rift Valley lakes, principally Nakuru, Magadi and Turkana and he worked various sites around Nairobi and Athi River, mainly for small Palaearctic passerines, frequently putting in several hours before beginning his lecturing duties. In his time back home in Suffolk, apart from migrants, his special interest was the Bearded Tit *Panurus biarmicus*, and he published extensively on this species, either alone or with others. It's worth noting that he (and I) could not bear the name 'Bearded Reedling' sometimes imposed on his writing by journal editors: the bird was either the Bearded Tit, or the Reedling, not an abominable combination of both!

Soon after the outstanding 'lighthouse effect' at Ngulia Lodge (in the middle of

Tsavo West National Park) was discovered in the autumn of 1969 by Alec Forbes-Watson, David joined Graeme and Daphne Backhurst to catch and ring birds there. This developed into the Ngulia Palaearctic Bird Migration project, which is still running today, although in a somewhat scaled-down manner, where well over half a million Eurasian migrants have been ringed so far, yielding over 250 controls and recoveries of thirteen species. Ngulia has also turned up two new taxa for Kenya: Savi's Warbler *Locustella luscinioides* (two records in different years, and still the only records for East Africa) and an example of a Palaearctic race of the Red-rumped Swallow *Cecropis daurica rufula*, and David was present for all three. The work at Ngulia has been written up in *Ibis*, *Scopus*, *EANHS Bulletin* and, most recently, in the fourth *Scopus* special supplement (The study and ringing of Palaearctic birds at Ngulia Lodge, Tsavo West National Park, Kenya, 1969–2012: an overview and update, 2014, Pearson, D., Backhurst, G. & Jackson, C.). In addition, in recent years he has written the narrative of the informal Ngulia annual reports, including that for 2016.

As a spin-off from the Ngulia work, David discovered a major site for wintering Barred Warblers *Sylvia nisoria* at Mtito Andei and, with Peter and Hazel Britton, several wintering populations of Basra Reed Warblers *Acrocephalus griseldis* in eastern Kenya. The Mtito Andei site was worked for three winters along with Swedish colleagues and findings published in *Ibis* and *Scopus*.

At Ngulia and at other ringing locations, David was always ready to help newcomers and others who knew less than he did (which of course meant most people). He was particularly interested in moult and ageing, and he produced a meticulous guide to the identification and ageing of most of the Palaearctic species encountered at Ngulia. This was necessary because Lars Svensson's excellent guide (*Identification guide to European Passerines*, 1992, Stockholm: the author) often did not cover the plumages in the months when the birds were found at Ngulia. However, the knowledge he gained from examining vast numbers of birds in the hand for ringing and at various museums was put to good use by his contributions to several leading handbooks on African, Palaearctic and world birds, culminating in the over 700-page magnum opus, *Reed and bush warblers* with Peter Kennerley (2010, London: Christopher Helm). David's last major work was the revision of the taxonomy of the East African white-eyes *Zosterops* spp. (Pearson, D.J. & Turner, D.A., 2017, *Scopus* 37: 1–13). He toiled for months over it, and the paper goes a long way to give a better understanding of this complex genus. It was a great final testimony to this exceptional individual.

David not only travelled widely in East Africa, but also made visits, with Gerhard Nikolaus to Khor Arba'at on the Red Sea coast of Sudan, Lake Alakol in eastern Kazakhstan, and to the Crimea, and at the last two sites joining local ringing teams, which included his good friend Sergei Yerokhov. He also took part in ringing operations in Iceland, Thailand, Jordan and northern Sweden.

When he returned to England in 1990, he slipped naturally back into ringing at Dingle, but also did some contract work locally for the RSPB and BTO. In contrast to this field work, he also devoted a great deal of time to museum work, mainly at the Natural History Museum at Tring. This, together with his own wealth of field experience, was put to good use when he co-wrote *Birds of Kenya and northern Tanzania* with Dale Zimmerman and Don Turner (1996, Halfway House, South Africa: Russel Friedman) and his extensive contributions to Howard & Moore 4 (Dickinson, E.C. & Remsen, J.V. (eds) 2013 and Dickinson, E.C. & Christidis, L. (eds) 2014, *The Howard & Moore complete checklist of the birds of the world*, 4th edition, two volumes, Eastbourne: Aves Press). In recent years David assisted Darcy Ogada as co-editor of *Scopus*, and

his contribution to the continuation of this little journal was vital and will be keenly missed.

David was a devoted family man and much enjoyed spending time at home in Reydon with his wife Maggie and their spaniel Bennie. They also enjoyed visiting their daughter Claire and her family in Edinburgh and their younger daughter Kathryn and her family in the south of France. Apart from ringing (often quite a strenuous pastime not restricted to just squeezing rings), David kept very fit by going on long walks with Maggie and Bennie, and by energetic digging and weeding in the garden and in his nearby allotment. In earlier years he enjoyed canoeing in Suffolk and wind-surfing on the Kenyan coast. For relaxation later in life he read mainly crime fiction and listened to classical music — Bach, Scarlatti, Beethoven and Schubert being favourite composers. He was also an avid listener and follower on TV of Test Match cricket. He was a fan of Norwich City football club all his life and he always supported Kenyan and Ugandan long-distance runners.

He had a wonderful sense of humour and often, for instance at Ngulia, we would all be convulsed with mirth, often aided and abetted by our trusty Viking and Flemish team members, over some quirk of pronunciation or other such triviality, frequently with reference to Monty Python or Inspector Clouseau. As our good friend Åke Lindström wrote on hearing of David's passing, "There were no doubts ever that we were soulmates with David, in an extremely nerdy (we admit that) and most wonderful and enjoyable way!" These sentiments were expressed by Anders Hedenström, Susanne Åkesson, Staffan Bensch, Dennis Hasselquist and I endorse them wholeheartedly. Another of his endearing qualities was talking on the phone: a call with David of less than half an hour was a rarity, an hour or more being a more usual time span!

The funeral on 6 October was held in the beautiful 14th century St Margaret of Antioch Church in Reydon, and was exceptionally well conducted and attended. David will be greatly missed, by all his friends and family and by his many friends from the bird world in Europe, Africa, America, and Australia and, not least, by Darcy Ogada, Don Turner and me.

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Scopus 38(1): 45–48, January 2018

Elizabeth Mary Baker
(1949–2017)

It is with great sadness that we announce the death of Elizabeth Mary Baker on 4 October 2017. Liz passed away in the Infectious Disease Ward at Manchester North Hospital after a brief illness with cancer of an unknown origin.

Liz was born in Perthshire, Scotland to Ian and Mary MacDougall on 25 June 1949. She first came to Tanzania when she was she was six years old. Her father took a job as a mechanic with the Tanganyika Railways Corporation and they travelled by ship through the Suez Canal. Their first posting was in the small town of Dodoma along the Central Railway Line. They then moved to Mbeya where Liz attended primary school and later to Iringa where Liz spent her teenage years. She did her secondary education in Nairobi at Kenya High School where she was the girls' tennis champion.

Liz returned to the UK for university and read Geography at the Polytechnic of North London. Even then her love for wildlife and nature came through when she returned to Tanzania to study elephants in Ruaha National Park as part of a university project.

After completing university, Liz returned to Tanzania to tutor her youngest sister, Christine. In 1974 she met and married, Alex Boswell, a tea farmer from Mufindi where they lived for the next 11 years. They had two daughters, Ailsa and Katie. Liz and Alex divorced in 1985 and she moved to Dar-es-Salaam where she and Neil Baker ringed over 5000 birds in a long-term study of the Pugu Hills avifauna. In 1995 they moved to Moshi and West Kilimanjaro where they lived from 1997 to 2003, ringing more than 7000 birds in their extensive garden. Their final move to Iringa in 2004 was a homecoming for Liz. They lived here until her untimely death this year.

Liz always had a very keen interest in Nature and was a true naturalist. She was able to put names on plants, trees, animals and on virtually every bird she saw or heard. She had a very good ear for bird songs and could identify most of the species in Tanzania from sound alone. At any house where Liz lived there was a progressive garden list of birds written on the wall with a marker pen. She inherited an open door policy from her mother and was always welcoming to people passing through, be they complete strangers or serious ornithologists, as well as wildlife researchers and conservationists.

Liz was a perennial champion of any underdog. This was evident in her activism

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during university when she joined street protests in London against apartheid. She continued to make a difference throughout her life by her ardent support and training of many Tanzanian and international students. She taught all of them to identify birds and some of them have continued to make a career out of wildlife research and surveys, using the skills they learned and developed under Liz's tutelage.

My first memories of being in the bush with Liz and Neil were in the 1980s when they went out to the Pugu Hills southwest of Dar-es-Salaam to catch and ring birds nearly every weekend. I was sent off to record the calls of the local endemics and to cut net lanes, put up mist nets and monitor the catch. That was an amazing time of learning the ropes on dealing with birds in the hand and taking down moult scores and other morphometric data for the record. I was privileged to travel to Minziro Forest west of Lake Victoria along the Uganda border with the Bakers for an early exploration of that area in July 1987. This was an old fashioned expedition with chairs, tables, tents and a lot of food and we enjoyed several fantastic weeks mist-netting birds there and finding many species in Tanzania for the first time.

Starting in the late 1980s, Liz and Neil were very active in conservation and were instrumental in facilitating behind the scenes policy development that led to the listing of the African Elephant on CITES Appendix 1. They were charter members of the Wildlife Conservation Society of Tanzania (WCST) and had a huge influence on that organization in its formative years. Liz and Neil worked together with WCST and Birdlife International to produce the first list of Important Bird Areas in Tanzania. This compilation was released in 2002 as a book—*Important Bird Areas in Tanzania: A first inventory*—and it remains an authoritative reference until this day.

In another project dear to Liz's heart, she co-authored and produced the first photographic guide to Tanzanian birds in Swahili — *Kiongozi cha Ndege wa Tanzania*.

Anchoring all of this training and conservation work was the Tanzania Bird Atlas project. This was started by Liz and Neil, and grew out of their realization of the need for a national effort to map bird distributions. This work became the focus of many fieldtrips over the next 32 years. 'Square bashing' became their ultimate sport and took Liz and Neil to many remote spots in the country. Their choice of camping spots was nearly always on quarter-degree square boundaries so they could make the most of their time in the bush to improve and further refine knowledge of bird distributions in Tanzania. Their favorite bragging rights were how many blue (empty) squares had been changed to yellow during a field trip. This fundamental work will forever stand as a memorial to Liz's insatiable curiosity to discover new and unusual facts about nature and document these for posterity.

Liz was never happier than when she was camping in some remote and beautiful corner of Tanzania. She usually had a group of people along to share the experience, but always made sure there were no slackers. Everyone was expected to pull their weight with camp chores and birding. Even her daughters were sent out first thing in the morning and told not come back for breakfast until they had found their first 50 species of the day. It is a tribute to her superb training skills that everyone was always back for breakfast before the morning shadows had shortened.

It was our privilege to have Liz as our nearest neighbour for the past two years. She often showed up for visits in the old Land Rover 130 and we spent many hours birding around our homestead and watching birds come to the birdbaths. Lizzy B will be hugely missed by the Moyer family, and the many others whose lives were made richer by her generosity, hospitality and love.

Liz is survived by her husband, Neil, her two daughters, Ailsa and Katie Boswell, and two siblings, Peter and Christine MacDougall.

Her first publication was on Lanner Falcons *Falco biarmicus* breeding on the bell tower of the Catholic cathedral in Iringa (Boswell 1983). Her first (of many) additions to the avifauna of Tanzania was the Streaky-breasted Flufftail *Sarothrura boehmi* (Baker, Beakbane & Boswell 1984), and to East Africa, the Black-naped Tern *Sterna sumatrana* (Baker & Baker 1989). Her most recent was the Southern Black Tit *Melaniparus niger*(Baker & Baker 2017). Her first new species to science was the Kilombero Weaver *Ploceus burnieri* (Baker & Baker 1990), and the two cisticolas from Kilombero valley still remain unpublished. But it is the first IBA book for Tanzania (Baker & Baker 2002) and the Atlas, for which she will be most remembered by those who did not know her personally.

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Scopus: Journal of East African Ornithology welcomes original contributions — which have not been published elsewhere — on all aspects of the ornithology of eastern Africa, encompassing the area from Sudan, Ethiopia and the Horn of Africa countries south to Mozambique, and including the Malagasy region.

Contributions comprise original (full) papers, short communications (normally under two pages in length, including short notes and records) and letters. Original articles and short communications should present some new findings that have not been published or been submitted for publication elsewhere. All submissions are subject to peer review. They will be assessed by at least one member of the editorial board as well as by independent referees.

The text must be written in (British) English following the preferred (first) spelling of the *Oxford dictionary of English*, Third edition, 2010, or later. Please type nothing in all capital letters unless the word is always spelled that way, e.g., 'UK'. Please include between four and six keywords for full papers, only. When preparing your manuscript, please follow the conventions used in *Scopus* and refer to a recent issue (volume 34 onwards) for guidance. Some examples of conventions are:

Papers: Title, authors' names, Summary or Abstract, body of the paper with any desired sub-headings, Acknowledgements (if any), References, names and addresses of the authors, Appendices (if any).

Short notes: Title, text (no Summary required), Acknolwedgements (if any), References, names and addresses of the authors.

Units: Metric units and their SI equivalents and abbreviations should be used. The

abbreviation should be preceded by a space, '5 km' not '5km'. Latitudes and longitudes in degrees and minutes, not decimal degrees.

Dates: 21 February 2001 [note the order, no comma, not 21st].

Time of day: 13:00 [note colon, no 'hours', 'hrs' or 'h'; 'h' is a unit of time, not of time of day].

Names of birds: For example, Olive Thrush *Turdus olivaceus* [no comma, no parentheses, no author's name or date (unless pertinent to a point in the text)].

References cited in the text: Cite multiple references in chronological order, separated by commas, e.g. (Njoroge & Launay 1998, Mlingwa *et al.* 2001) [note ampersand, italicized '*et al.*', no comma between authors' names and date].

List references at the end of an article: See the examples below for format. When printed, authors' names appear in capitals and small capitals *but they should be typed in ordinary roman as shown below.*

Give names of journals in full. (For books, after author(s), year of publication and title, give town followed by the publisher.) Examples:

Cordeiro, N.J. & Githiru, M. 2000. Conservation evaluation for birds of *Brachylaena* woodland and mixed dry forest in northeast Tanzania. *Bird Conservation International* 10: 47–65.

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Urban, E.K., Fry, C.H. & Keith, S. (eds) 1986. *The birds of Africa*. Vol. 2. London: Academic Press.

BirdLife International 2013. Species factsheet: *Balearica regulorum*. Downloaded from http://www:birdlife.org on 14/05/2013.

Both English and scientific names of birds should be given when the species is first mentioned — in the title and in the text — thereafter only one name should be used but both English and scientific names should be given in captions to figures.

Bird names should be those of a stated work. Any deviations from this work should be noted and the reasons given.

Black-and-white or colour photographs and line illustrations should be provided as separate graphic files in JPEG or TIFF format. All articles should be submitted by email in Microsoft Word or as a Rich Text Format (RTF) file.

Please send all contributions to The Editors, *Scopus: Journal of East African Ornithology*, Email: scopus@naturekenya.org

Rare birds in East Africa

Records of rare birds from Kenya, Tanzania and Uganda are assessed by the East Africa Rarities Committee. Records from other countries in the region can also be submitted for review and possible publication in *Scopus*. A full account of the record should be sent to the committee Chairman, Nigel Hunter (nigelhunter@timbale.org) and the *Scopus* editors.

The East Africa Natural History Society

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National Bird Mapping Projects

Kenya Bird Map
kenyabirdmap.adu.org.za

Tanzania Bird Atlas
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